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BIRD-BANDING

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BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. XIII JANUARY, 1942 No. 1

MIGRATION OF CASPIAN TERNS BANDED IN THE GREAT LAKES AREA

BY FREDERICK E. LUDWIG

THE Great Lakes have long supported colonies of Caspian Terns. These have been more or less systematically banded since 1924. The largest colony nests on Shoe Island which lies in the northern part of Lake Michigan at the north of Beaver Island. Gravelly Island, Wisconsin, and Gravelly Island, Michigan, near the Wisconsin-Michigan state line have also borne moderate size colonies. There have been small colonies in Georgian Bay off the Ontario shore. Systematic banding was done by the late William I. Lyon in the Lake Michigan colonies from 1924 through 1937. Banding by our banding station was begun on Shoe Island in 1934 and has continued progressively through 1940.

The Caspian Tern is found generally throughout the Great Lakes region during the summer months. The breeding adult birds are found near the nesting colonies from May until August. Non-breeding adults and young birds that have not attained adulthood are found, generally, alone or in pairs over the entire Great Lakes area. In 1929 and 1930 the nearest nesting colony of Caspian Terns to Saginaw Bay was Shoe Island in Lake Michigan. During those two years twelve Caspian Terns were taken as specimens, and all and all of these were non-breeding birds. These specimens were taken at a large Common Tern colony during banding operations in Saginaw Bay.

The nesting areas of the Caspian Terns are widely separated, and are some distances from the mainland. Banding operations are made much more difficult because of the great distances we have to travel to get to the colonies. Consequently, our banding is done on one trip to the island or, at the most, two trips. We then have to plan to be at the island when the maximum number of young are hatched and available for banding. We have found that the first three or four days of July usually offer the best banding dates for the Caspian Terns. However, some years, when there is a late season, these birds fail to hatch before the middle of July.

When going into a Caspian Tern colony we often see an awesome sight. All the adult Caspian Terns fly close to the ground and circle directly overhead. Occasionally two or three of the adult birds will attempt to drive you off the island by flying down in a swoop

towards your head. Their bright contrasting plumage and the reddish-orange bill extended towards your head makes you duck repeatedly. The young Caspians hide amongst the stones, and often times swim away from the island as we go about our banding. The adult birds keep the young birds from getting too far away from the island. Later, after we have left the colony, the adult birds drive the young back to shore.

Occasionally there are a few Herring Gulls nesting on Shoe Island which bears the largest colony of Caspian Terns. If the young Herring Gulls get into the Caspian Tern colony the adult Caspians will immediately kill the young birds by scalping them. In a like manner the young Caspians, if they get out of bounds, may be similarly treated by the adult Herring Gulls. Scalping of the young birds is practiced by these species to a larger degree when large numbers nest close together. In 1929 Shoe Island was under water and the Caspians moved to Hat Island about one-half mile to the north. The large colony of Herring Gulls on Hat Island had many a fight with the adult Caspians, and mortality among the young of both species was very high. However, as a general rule, the birds stay segregated in their respective colonies.

Table No. I shows the banding records of those birds banded by William I. Lyon. In 1924 and 1925 there are no available banding records to show the number of birds banded. After 1926 complete banding records were kept by the Bureau of Biological Survey, and those records were supplied by them. During Mr. Lyon's banding experience some 4,068 Caspians were banded as immature birds. From this number banded there have been 67 returns to date. This equals 1.64 per cent returned from the number of birds banded.

TABLE NO. I

CASPIAN TERNS BANDED BY WILLIAM I. LYON

Year	*Number Banded*	*Number Returns*	*Per Cent Returned*
1924	...	7	...
1925	...	5	...
1926	239	7	2.93
1927	599	11	1.76
1928	146	3	2.03
1929	324	5	1.54
1930	231	6	2.59
1931	509	9	1.76
1932	460	7	1.51
1933	323	4	1.24
1934	346	2	0.57
1935	365	1	0.27
1936	425	0	0.00
1937	117	0	0.00
14 Years	4,068	67	1.64

Table No. II shows the banding data on the Caspian Terns that we have banded on Shoe Island in the past seven years. The total number banded is 3,957, from which we have received 43 returns. This is an average of approximately 1.18 per cent.

TABLE NO. II

CASPIAN TERNS BANDED BY F. E. and C. C. LUDWIG

Year	*Number Banded*	*Number Returns*	*Per Cent Returned*
1934	592	6	1.00
1935	648	8	1.25
1936	782	11	1.41
1937	654	16	2.44
1938	537	1	0.18
1939	347	1	0.28
1940	397	0	0.00
7 Years	3,957	43	1.18

Combining the two sets of records we find that there have been 8,025 young Caspian Terns banded by Mr. Lyon and the Ludwig Banding Station. There have been 110 returns, with a gross percentage of 1.41 per cent returned up to date. There will undoubtedly be additional returns from these banding records.

The relation of returns to the year banded and subsequently figured to show the length of life is perhaps one of the most interesting studies of the bird banding work. The records from the Caspian Terns bear out the findings with the other birds in relation to mortality figures. The largest mortality occurs in the first year of life. In fact, the largest mortality appears in the first six months of life, followed closely by the mortality in the first calendar year after banding. Natural selection plays a big part in the life of these birds, and if they survive for two and one-half years they are apt to have a fairly long life. Table No. III gives the distribution of these returns in relation to their length of life. The oldest record in this series is a twelve-year bird which was banded by Mr. Lyon in 1927, and recovered in 1939 in England. (From the *Auk*, October, 1940.) This is thought to be the only authentic record of the American form of the Caspian Tern to have been recovered in Europe. A twelve-year record is a good record but the Caspians have been known to live up to twenty years. Additional records later in this series may help to set other longevity records as new returns come in to the Biological Survey.

TABLE No. III

When Returned	*Number Returned Lyon*	*Number Returned Ludwig*	*Totals*
Year Banded	24	20	44
First Calendar Year After Banding	21	10	31
Second " " " "	9	9	18
Third " " " "	2	2	4
Fourth " " " "	2	0	2
Fifth " " " "	3	1	4
Sixth " " " "	2	1	3
Seventh " " " "	1	0	1
Eighth " " " "	2	0	2
Twelfth " " " "	1	0	1
Totals	67	43	110

Beginning with the third year after banding the returns are fairly well distributed over the next six-year period. The majority of these returns are from the states bordering upon the Great Lakes; and these adult birds were undoubtedly going away from or coming to the nesting areas.

The accompanying map shows the general distribution of all returns recovered to date. The open circled spots are those returns on birds banded by Mr. Lyon. The closed circles are those banded by the Ludwig Banding Station. The most interesting return cannot be shown on this map which is the previously mentioned return in England. Other returns which are very interesting are the four from Colombia, South America, all of which were banded by the Ludwig Station. All of these Colombia returns came from the same area, Barranquilla. One of our birds was also found dead in Cuba at Nipe Bay. Mr. Lyon had another bird recovered from Haiti. This bird was recovered November 5, 1939 at Port-Au-Prince, and is the first record of this species for Haiti.

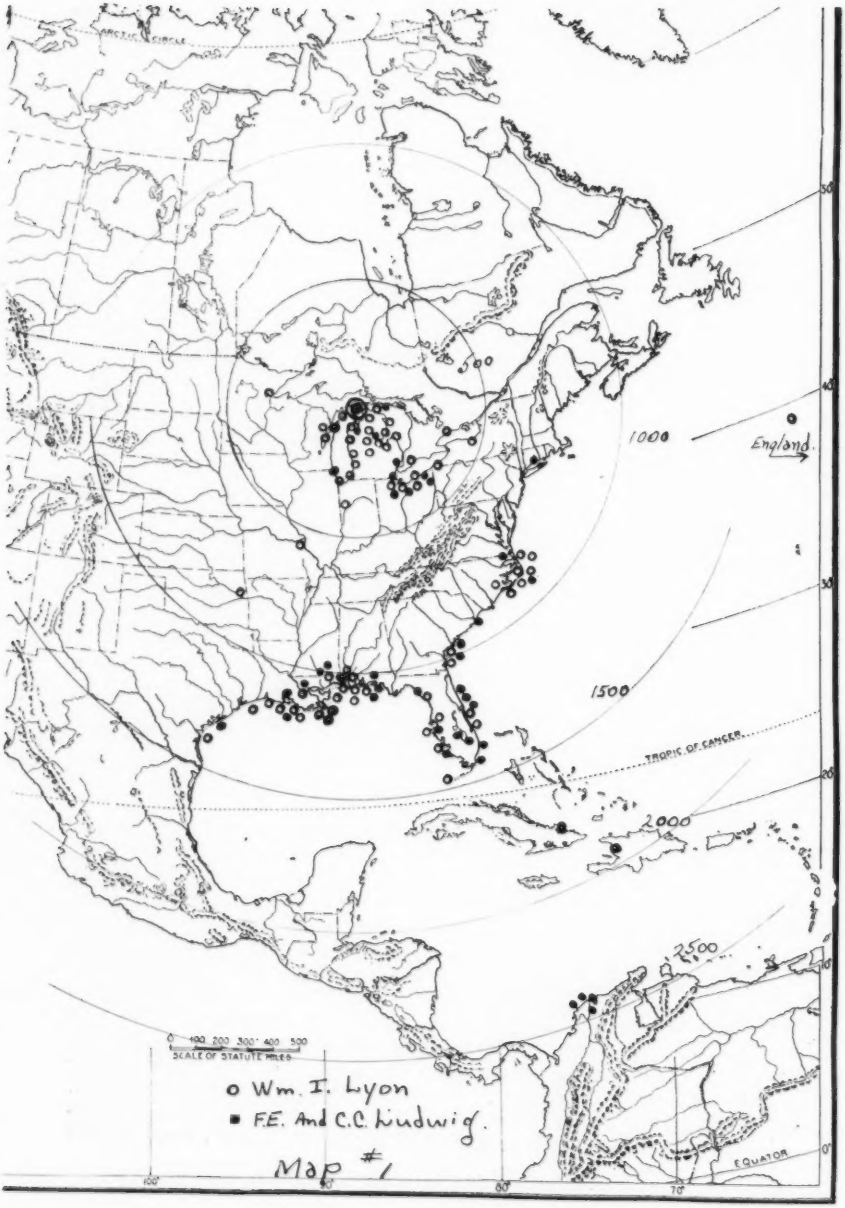
There are twenty-four states or countries represented by these return records. Most of the returns come from the southern states, and those states bordering upon large bodies of water near the nesting areas. Table No. IV is a detailed breakdown by states and countries of these return records. Only 38 of the 110 returns are from the Great Lakes Area. Of this number 26 were returned in the first six months following banding. The other twelve return records were from one year birds or adults which have returned to nest later on.

TABLE NO. IV

State or Country	*Number Returned Lyon*	*Number Returned Ludwig*	*Totals*
Alabama	5	3	8
Connecticut	..	1	1
Florida	8	10	18
Georgia	2	2	4
Illinois	3	..	3
Indiana	1	..	1
Louisiana	9	4	13
Michigan	14	6	20
Minnesota	1	..	1
Mississippi	1	3	4
Missouri	1	..	1
New York	1	..	1
North Carolina	7	2	9
Ohio	4	4	8
Oklahoma	1	..	1
Pennsylvania	1	..	1
South Carolina	..	1	1
Texas	1	1	2
Wisconsin	3	1	4
Colombia, South America	..	4	4
Cuba	..	1	1
Ontario	2	..	2
Haiti	1	..	1
England	1	..	1
24 States or Countries	67	43	110

The map shows very well the general winter range of the Caspian Tern. From Texas to North Carolina there are many records of these birds. There are three records in April, one in May, two in June, two in July, and two in August of one or two year birds which have been returned from North Carolina to Colombia during the summer months. However, the majority of the southern returns occur from September to March.

The summary of the distance in miles of these returns recorded by years gives us some idea as to the period in the Caspian Tern's life when he travels the most. Table No. V gives those figures showing the average number of miles for each return recovered in any one year. In the first six months many of the young terns are killed near the nesting area. During the first year after banding, and the second year after banding each bird traveled more on an average than in the other years. The third, fourth, sixth and eighth years after banding the average distance away from the nesting areas is somewhat smaller. Many of the returns during those years came from close by the nesting areas. The fifth, seventh and twelfth year birds average farther away due to the far flights of one or two birds. From this, the general conclusion is that the third year after banding the Caspians return to the nesting areas and can be considered


ARCTIC CIRCLE
1000
England
1500
TROPIC OF CANCER
2000
2500
0 100 200 300 400 500
SCALE OF STATUTE MILES
o Wm. I. Lyon
■ F.E. And C.C. Ludwig.
Map #1
EQUATOR

adult birds from then on. The first calendar year after banding and the second calendar year after banding can be considered the travel period and the non-nesting period in this bird's life. It is entirely possible that some of the older birds fail to nest and become wanderers such as the seventh and twelfth year records in this series.

TABLE NO. V

DISTANCES OF FLIGHT

Year	*Number Returns*	*Average Distance in Miles*
Year Banded	44	581
First Calendar Year After Banding	31	1,033
Second " " " "	18	1,277
Third " " " "	4	825
Fourth " " " "	2	575
Fifth " " " "	4	1,050
Sixth " " " "	3	233
Seventh " " " "	1	1,900 (Haiti)
Eighth " " " "	2	625
Twelfth " " " "	1	3,500 (England)

The distribution of the returns by months gives an excellent picture of the activity of the Caspian Tern throughout the year. July is the usual month when the birds are nesting. In August many of those birds die near to the nesting colony. In August the average mileage away from the banding area is 265 miles. The fall months through February show a gradual increase to 1,414 miles average away from the banding area. March, April, May and June the birds begin to filter back northward, and the average distances are less than those for the winter months. April shows an average somewhat higher than the other spring months because one of the return records in this month was from Colombia, a total of 2,500 miles away from the banding area.

TABLE NO. VI

DISTRIBUTION OF RETURNS BY MONTHS

Month	*Number Returns*	*Average Mileage from Banding Area*
July	6	475
August	13	265
September	17	444
October	9	844
November	14	1,040
December	10	1,305
January	15	1,303
February	7	1,414
March	4	900
April	4	1,200
May	5	460
June	5	600
	109 Returns	

There are a number of interesting banding records which bear repeating in this series. Those records are listed in Table No. VII. These are chosen to show, mainly, the rate of dispersion of some of these birds from one section of the country to another. Also, these records show in detail the most interesting and distant records of the Caspian Terns in this series.

TABLE No. VII

Band No.	*Date Banded*	*Bander*	*Date Returned*	*Place Returned*	*Distance (Miles)*
....	July 9, 1932	Lyon	Nov. 5, 1939	Port-Au-Prince, Haiti	2,100
....	July 15, 1927	Lyon	1939	York County, England	3,500
34-525080	July 7, 1934	Ludwig	Jan. 10, 1939	Barranquilla, Colombia	2,500
34-415908	July 2, 1935	Ludwig	April 1, 1936	Barranquilla, Colombia	2,500
34-415946	July 2, 1935	Ludwig	Dec. 15, 1935	Cartagena, Colombia	2,500
37-638609	July 3, 1937	Ludwig	Feb. 26, 1939	Barranquilla, Colombia	2,500
34-514749	July 2, 1935	Ludwig	Nov. 5, 1935	Nipe Bay, Cuba	1,600
A-564484	July 2, 1933	Lyon	Oct. 21, 1933	Manteo, N. C.	850
565411	July 8, 1927	Lyon	May 19, 1932	Port Clinton, Ohio	400
565656	July 8, 1927	Lyon	Nov. 1, 1927	Bayou La Batre, Ala.	1,100
706243	July 6, 1928	Lyon	Sept. 18, 1929	Tybee, Ga.	1,000
34-529934	June 25, 1934	Lyon	Sept. 2, 1934	Oak Harbor, Ohio	450
565957	July 14, 1927	Lyon	Aug. 7, 1935	Petosky, Mich.	50
B-608973	July 18, 1931	Lyon	Sept. 1, 1931	Wilmington, N. C.	1,000
34-415390	July 2, 1935	Ludwig	Sept. 14, 1935	Marion, Ala.	1,100
34-525411	July 7, 1934	Ludwig	Oct. 20, 1934	Beaufort, N. C.	1,000
37-638118	July 3, 1937	Ludwig	Oct. 19, 1937	Cape Hatteras, N. C.	875
36-654072	July 1, 1936	Ludwig	Sept. 12, 1936	Cleveland, Ohio	400

The dispersion of the Caspian Tern is rapid during the first few months of the bird's life. Notable among the records is the bird banded on July 2, 1935 and recovered in Colombia, South America in December 15, 1935, a distance of 2,500 miles in five months and thirteen days. Another bird from that same flock was killed in Cuba on November 5, 1935, a total of four months and three days after banding. Another bird from the July 2, 1935 banding was killed September 14, 1935 at Marian, Alabama, a distance of 1,100 miles. A fourth record banded on July 2, 1935 was recovered in Colombia on April 1, 1936. We have these four records to illustrate an unusual circumstance in relation to the Terns. All other years the banding records are more leisurely scattered throughout the country. In 1935 this particular flock of birds flew great distances in a short time, and were recovered in steps from Alabama to Cuba to Colombia. To date this is the only year amongst our records showing this pattern. However, in some unpublished work with the Common Tern I have found the same factor exhibited in two widely separated colonies. Birds from the 1931 Common Tern banding traveled rapidly to Peru, a distance of 3,600 miles in ten months. Why certain flocks of Caspian Terns and the Common Terns travel farther and faster I cannot say. The 1935 banding of Common Terns did not fly as far as the 1931; and did not follow the 1935 flock of Caspian Terns. This problem will be followed in detail in the following years to see if there is any correlation between these two species and the distances which they travel.

SUMMARY

1. Caspian Terns nest on three islands in Lake Michigan and two or three islands in Georgian Bay.
2. Nesting is done in compact colonies, and is seldom done in association with other species, such as the Herring Gull.
3. Banding and return records of the late Mr. William Lyon with those of the Ludwig Banding Station have been reviewed in detail.
4. 8,025 young Caspian Terns have been banded with 110 returns recovered.
5. The largest mortality appears in the first six months of life.
6. 24 states or countries are represented in this series of returns.
7. The winter range of the Caspian Tern extends from the southern United States to the West Indies, Central and South America.
8. The Caspian Tern travels more during the first three years of life.
9. The Caspian Terns probably do not nest until the third year of life.

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MEASUREMENTS OF TARSAL CIRCUMFERENCES FROM LIVING RAPTORIAL BIRDS

BY ROBERT M. STABLER AND NELSON D. HOY

INTRODUCTION

IN a recent note, Pough (1939) gave a series of measurements made on museum skins of the circumferences of the tarsi of a group of hawks, kites, eagles and vultures. Also listed were suggested band sizes for these birds. Completely lacking were measurements from living birds, for, as Pough pointed out, such data have not been extensively collected.

Inspired by this note and its plea for the accumulation of such measurements, the writers began the collection of data on all available living or freshly killed raptores. It was felt that information on 245 individuals, representing 28 species, was significant enough for publication.

The Pennsylvania Game Commission permit held by one of us (R. M. S.), allowing the handling of the protected species, is gratefully acknowledged.

MATERIAL

We were careful to measure no birds prior to the minimum banding age (about three weeks). The measurements were taken as follows: a light cotton thread was knotted snugly around the tarsus midway between the foot and the tibio-tarsal joint. The thread was

then cut with a razor and the loop was straightened out and measured, thus giving accurately the tarsal circumference.

A considerable number of these birds were in the hands of individuals as pets, trained falcons, etc. For example, the four gyrfalcons belonged to Captain R. L. Meredith, of Boonton, New Jersey who obtained then alive from Greenland. However, the majority were wild ones measured at the time of banding.

The freshly killed birds which we measured, met their deaths in a variety of ways. Many, especially the Sharp-shinned Hawks, were measured after a day's collection in the wake of the gunners in the Hawk Mountain area. Others were picked up during the regular open season on upland game. The remainder were birds found struck by automobiles, taken from operators of pole-traps, and obtained from coöperating taxidermists.

OBSERVATIONS

The question of the actual sizes of the bands used on raptores was first considered. The circumference in millimeters of bands 3 to 8 (taken from Pough's paper—expressed there in inches) is approximately as follows: no. 3, 17.5; no. 4, 22.5; no. 5, 27.0; no. 6, 33.5; no. 7, 45.0; and no. 8, 70.0. Whereas the difference between bands 3 and 4, 4 and 5, and 5 and 6 respectively is about 5.5 mm., that between numbers 6 and 7 is 11.5 mm. and between 7 and 8 is 25.0 mm. The significance of these figures becomes apparent when one examines the table, wherein are expressed Pough's tarsal measurements as compared to the writers', plus suggested band sizes from several sources. The bands recommended by the present authors are chosen on the basis that it is best to band with the smallest ring which will cause the bird no discomfort. This minimizes loss over the foot and reduces the ever-present danger of extraneous material lodging between band and leg.

Inspection of the table reveals that although we are in general agreement with previously listed band sizes, some further suggestions are indicated. According to the measurements, no. 3 is the correct band for Sharp-shins. For the Swainson's and Harris' Hawks, although too few data are available for finality, no. 6 seems best. Even though only two Pigeon Hawks were measured, the probable size range does not seem to warrant a band larger than no. 3. This is also the proper size for the Sparrow Hawk.

Despite the fact that only a single record was obtained for the Black Vulture, this measurement fits in well with data for the Turkey Vulture, which finds no. 8 much too large and no. 6 too small, 7 being correct.

In a number of instances it was found that a particular band, correct for most members of a species, was too large for certain individuals. For instance, some few Red-tails are too small for no. 7; some Red-shoulders for no. 6; some Broad-wings for no. 5 (no. 6

Bird (*Arranged according to band size—smallest first*)	*Tarsal Circumference in Millimeters*				*Band Size Recommended*			
	Stabler and Hoy Data			*Pough's (1939) List**	*Old Audubon Soc. List*	*Pough's (1939) List*	*Bird Banding Notes*	*Stabler and Hoy*
	Number Birds	*Range*	*Average*					
Hawk, Sharp-shinned	27	10–14	12.0	14.5	3	4	3	3
Hawk, Pigeon	2	14–14	14.0	16.0	3	4	4	3
Hawk, Sparrow	44	11.5–14.5	13.2	12.5	3	3	4	3
Owl, Saw-whet	1	–	19.0	–	–	–	4	4
Hawk, Marsh	4	17–22.5	18.8	22.0	5	5	5	4 and
Hawk, Broad-winged	6	18–24	21.6	22.5	5	5	6	4 and
Owl, Screech	16	18–21.5	19.2	–	5	–	5	5
Hawk, Cooper's	21	18.5–25.5	22.2	22.5	5	5	5	5
Owl, Long-eared	6	17–28	23.1	–	–	–	6	5 and 6
Owl, Barn	11	22.5–29	26.0	–	6	–	6	5 and 6
Hawk, Red-shouldered	17	21–29	23.7	25.0	6	6	6	6
Hawk, Swainson's	2	28–30	29.0	32.0	–	7	6	6
Owl, Short-eared	1	–	29.5	–	–	–	6	6
Hawk, Harris'	3	26–31	28.0	29.0	–	7	–	6
Falcon, Prairie	5	25–31	28.2	24.5	–	6	6	6
Caracara, Audubon's	2	30–31	30.5	28.5	7	6	–	6
Hawk, Duck	13	22.5–34	28.4	28.5	6	6	6	5, 6 and 7
Goshawk	7	24–33	28.6	28.5	–	6	6	6 and 7
Hawk, Red-tailed	23	28–38.5	32.6	38.5	7	7	7	6 and 7
Gyrfalcon	4	33–35	34.5	32.0	–	7	–	7
Owl, Barred	1	–	36.0	–	6	–	7	7
Vulture, Black	1	–	39.0	33.5	8	7	8	7
Vulture, Turkey	6	36–40	37.8	28.5	8	6	8	7
Owl, Snowy	1	–	50.0	–	–	–	8	8
Owl, Great Horned	6	44–51	47.3	–	8	–	8	8
Osprey	8	41–53	46.0	41.5	6	7	8	8
Eagle, Bald	3	50–58	53.3	51.0	8	8	8	8
Eagle, Golden	4	61–71	66.0	57.5	8	8	8	8

* These were given in inches and have been transposed into millimeters for the sake of comparison. Also, Pough did not state the number of birds measured, nor whether his figures represented averages.

seems much too large); some Marsh hawks for no. 5, and so on.

In the case of the Peregrine, an unusual range was noted. Some very small males took a no. 5, and some females were actually too large for no. 6. The Peregrines listed for no. 7 bring up another suggestion. Several species are slightly too large for no. 6, and find no. 7 much over size (Goshawk, Gyrfalcon, Peregrine), while others are similarly too large for no. 7 and find no. 8 too big (Snowy and Great Horned Owls, Osprey). As a result of these situations, we should like to recommend strongly the formation of two new band sizes, a no. 6A—circumference about 39 mm., and a no. 7A—circumference about 58 mm. The 6A would be perfect for such as large Goshawks, Gyrfalcons and Peregrines, where no. 7 is too large, and the 7A would fit better on Ospreys, Great Horned Owls and Snowy Owls, where no. 8 is over-size. In banding several Great Horned Owls and Turkey Vultures, it has been found necessary to cut down the band recommended, a practice which we feel has little in its favor.

In two of the species studied, we have sufficient data from both nestling and post-nestling (adult and immature) individuals to allow for a comparison of the tarsi of the two age groups. We are fortunate in that one is a species with a feathered tarsus (Screech Owl), the other with a naked tarsus (Sparrow Hawk). In the case of the falcon, the nestlings gave an average circumference of 13.2 mm., the older ones an identical figure. The nestling owls averaged 18.6 mm., while the grown birds averaged 19.7 mm. In other words for Sparrow Hawks at least, there is no average difference between the tarsal circumferences of nestlings over three weeks of age, and birds that have left the nest and are on their own. The slightly greater average for the post-nestling Screech Owls can probably be accounted for by the increase of tarsal feathering over that of the nestling.

CONCLUSIONS

1. Data are presented on the tarsal circumferences of 245 raptores, representing 28 species. Band sizes are recommended on the basis of these data.

2. It is urged that a new band between nos. 6 and 7, and one between nos. 7 and 8, be issued. The first (6A) should be about 39 mm. in circumference, the second (7A) about 58 mm.

3. Finally, we should like to suggest that it is probably unwise to recommend but a single band size for certain species of raptores, where individual variation is a pronounced characteristic.

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RELATIVE ABUNDANCE AND SEX RATIOS OF WARBLERS*

BY EDWIN A. MASON

INDICES to song bird populations can be obtained from the records compiled by bird banding stations. An especially good opportunity is offered by migrating warblers that have to pass through a banding station's territory to reach their nesting grounds.

A line of traps in operation can be compared to a seine being swept through a lake, the only difference being that the birds are mobile, the traps immobile; whereas the fish are immobile in a general sense, the net mobile. Both mechanisms catch a sample of the population present. There are, of course, inherent limitations in both these sampling techniques, but they have value when their limitations are taken into consideration. Seining of ponds is an accepted technique of sampling fish populations.

As an example of the way indices to abundance and sex ratios can be obtained from bird banding records, the results of trapping operations at the Wharton Bird Banding Station, Groton, Massachusetts, during the period May 5 to June 7, 1939, as applied to the Wood Warblers (*Compsothlypidae*), are here presented:

Charting on the graph the totals of birds banded, we find that two main warbler movements occurred, and that the movement culminating on May 20 stayed for a longer period in the area than did the one reaching its peak on May 27. Table I shows that the greatest number of species were present in the period May 19 to May 27, and that never more than 13 were trapped on any one day. During the same period 196 warblers were banded—80% of the total. The abruptness of the exodus of warblers from the area is shown clearly in both Table I, and the graph. After May 27, only 13 individuals of 4 species were taken. It should be noted that the species listed in Table I, are in the order of their first appearance.

Griscom (1939), in his notes for the Boston Region covering the 1939 spring movement, writes: "On May 18 . . . a great wave rolled in, with birds in . . . great variety and abundance. . . . Another wave on May 20 . . . can only be described as prodigious and spectacular. . . . From then on birds remained common until May 27. . . . " Comparing these notes with the data from Table I presented in the graph, we find a gratifying correlation.

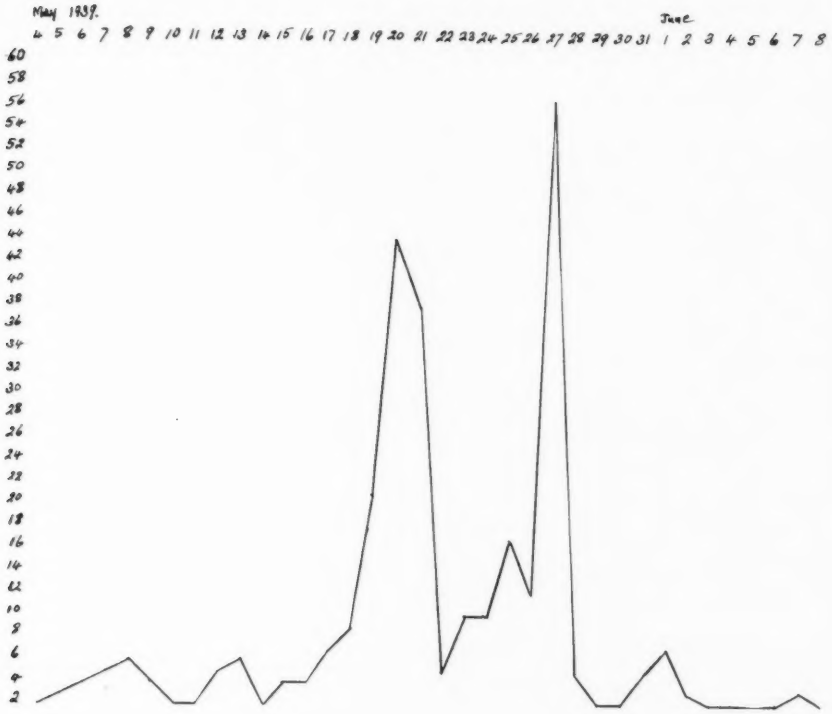
Table II gives specific and sex ratios. While we find that out of the 217 birds sexed, 118 were males and 99 females, perhaps not too unbalanced a ratio, we do find a greater divergence for some species.

*A contribution from the Wharton Bird Banding Station.

Table No. I

Warblers Banded at Wharton Bird Banding Station, Groton, Massachusetts, Spring 1939

	May																									*June*								
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	*Totals*
Yellow Palm	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Nashville	–	–	2	3	3	–	–	–	1	–	–	1	–	2	2	–	3	3	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	22
Orange-crowned	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Chestnut-sided	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	4	1	–	–	–	2	–	2	–	–	–	–	–	–	–	–	–	–	–	–	12
Wilson's	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	1	1	1	–	1	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	9
American Redstart	–	–	–	–	–	–	–	–	1	1	–	1	2	1	–	1	1	1	–	1	–	–	3	2	1	–	–	1	1	–	–	–	–	–	–	–	–	18
Black-throated Green	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	2	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	6
N. Parula	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	4	8	4	–	–	–	3	3	2	–	–	–	–	–	–	–	–	–	–	–	–	–	25
Cape May	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Tennessee	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	4
N. Yellow-throat	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	3	6	3	–	–	–	1	–	1	–	–	–	–	1	–	–	–	–	–	–	–	–	16
Black and White	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Magnolia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	3	8	8	1	1	4	6	2	3	–	–	–	–	–	–	–	–	–	–	–	–	–	39
Yellow	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Black-throated Blue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	3	1	1	–	2	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9
N. Pine	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Canada	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	10	–	1	–	–	1	6	–	–	–	–	–	–	–	–	–	–	–	–	–	20
Blackpoll	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	1	–	2	1	1	1	31	2	–	–	2	2	1	–	–	–	–	1	–	–	49
Myrtle	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Blackburnian	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	3
Bay-breasted	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Mourning	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1
Total Individuals Banded	0	1	2	3	4	2	0	0	3	4	0	2	2	5	7	19	42	36	3	8	8	15	10	55	3	0	0	3	5	1	0	0	0	0	1	0	244
Total Species Represented	0	1	1	1	2	2	0	0	3	4	0	2	1	4	4	9	12	13	3	3	6	4	7	5	12	2	0	0	4	1	0	0	0	0	1	0	



WARBLER MIGRATION AS SHOWN BY THE NUMBER BANDED
WHARTON STATION, GROTON, MASSACHUSETTS
SPRING 1939

Braun (1935), in his excellent study of warbler migration at Canton, Ohio, had an even more balanced sex ratio. Citing the figures for 1933–34, he banded 165 males to 161 females. In 1939 (correspondence) he obtained a more unbalanced ratio during the period April 25–May 27, obtaining 201 males to only 149 females.

THE 1940 SPRING MIGRATION

Compiling the data from the trapping records for the spring of 1940 along the same lines, we find they are obviously too few to be of much value. The reason so few warblers were taken is that a

great deal of precipitation occurred which coincided with the main warbler movements. Shimmering water in a trap cannot compete with pouring rain and dripping foliage. Conditions of this kind are comparable to a hole in the seine, and can be expected to occur at individual stations periodically.

TABLE NO. II
SEX RATIO OF WARBLERS BANDED AT GROTON, MASSACHUSETTS
SPRING 1939

	Male	*Female*	*Total*
Black and White	–	–	2†
Tennessee	2	2	4†
Orange-crowned	–	–	1†
Nashville	–	–	22†
N. Parula	11	14	25
E. Yellow	0	2	2
Magnolia	23	15*	39‡
Cape May	1	0	1
Black-throated Blue	3	6	9
Myrtle	0	1	1
Black-throated Green	3	3	6
Blackburnian	0	3	3
Chestnut-sided	8	4	12
Bay-breasted	0	1	2‡
Blackpoll	27	22	49
Pine	0	1	1
Yellow Palm	1	0	1
Mourning	1	0	1
Northern Yellow-throat	6	10	16
Wilson's	8	1*	9
Canada	11	9	20
American Redstart	13	5	18
22 Species	118	99	244

TABLE NO. IV
SEX RATIO OF WARBLERS BANDED AT GROTON, MASSACHUSETTS
SPRING 1940

	Male	*Female*	*Total*
Black and White	–	–	1†
Nashville	–	–	4†
N. Parula	2	0	2
E. Yellow	1	1	2
Magnolia	4	3	7
Cape May	0	1	1
Black-throated Blue	2	2	4
Black-throated Green	1	0	1
Blackpoll	3	1	4
Yellow Palm	1	0	1
N. Yellow-throat	4	1	5
Wilson's	–	–	1‡
Canada	2	2	4
American Redstart	1	5	6
14 Species	21	16	43

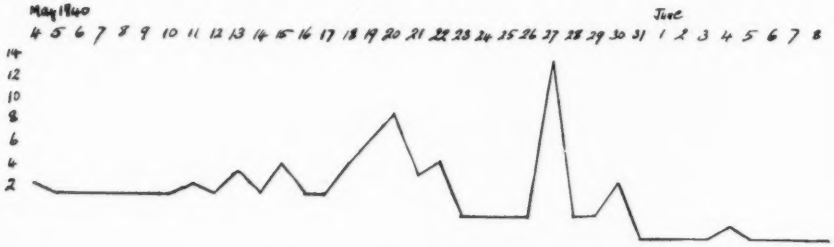
†Determinations too indefinite.
* Includes one questionable determination.
‡ Includes one undetermined.

TABLE III

WARBLERS BANDED AT WHARTON BIRD BANDING STATION, GROTON, MASSACHUSETTS, SPRING 1940

	May																									*June*								
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	*Totals*
Yellow Palm	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Magnolia	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	1	1	–	1	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	7
Nashville	–	–	–	–	–	–	–	–	2	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Black and White	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
N. Yellow-throat	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	2	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	5
N. Parula	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Black-throated Blue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	4
Cape May	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Black-throated Green	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
American Redstart	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	6
E. Yellow	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	2
Canada	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	4
Black Poll	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	4
Wilson's	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1
Total Individuals Banded	1	0	0	0	0	0	0	1	0	2	0	3	0	0	3	5	7	2	3	0	0	0	0	12	0	0	3	0	0	0	0	1	0	0	0	0	43
Total Species Represented	1	0	0	0	0	0	0	1	0	1	0	3	0	0	2	5	4	1	3	0	0	0	0	6	0	0	1	0	0	0	0	1	0	0	0	0	

The data being so few, comparisons would be worth little. It is, however, a remarkable coincidence that again in 1940 peaks of abundance were reached on precisely the same dates as in the previous year, *i.e.*, May 20 and 27. Braun (1935) found in his two-year study a similar tendency.



WARBLER MIGRATION AS SHOWN BY THE NUMBER BANDED
WHARTON STATION, GROTON, MASSACHUSETTS
SPRING 1940

Only from a long series of reports as the ones presented and referred to here could worthwhile comparisons and conclusions be attempted. The material is not difficult to assemble. It can be taken by banders with ease and dispatch from the Fish & Wildlife Service Schedules before these are sent to Washington.

By restricting the studies to the spring migration, the information obtained would give an insight to the status of the family as a breeding population. In most species the sexes can be differentiated. There would be no confusion from the inclusion of immature birds. In general, residents would also be excluded: A sampling of the warbler population as it swept up the country to its breeding grounds would be obtained.

Reports from banding stations located at various points along the flyways would build up in time a valuable mass of data. A uniform method of presentation would vastly increase their usefulness. Reports from such a chain of stations would throw important light on relative abundance between specific members of the family; variables in the abundance of species from year to year; variables in sex ratios.

Because of the importance of the sex ratio factor in the status of a species, this branch of ornithological research is deserving of more attention. Banders are in a particularly good position to make valuable contributions.

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RESULTS OF 1940 BIRD BANDING AT AVERY ISLAND, LOUISIANA, WITH SPECIAL ACCOUNT OF A NEW BANDING METHOD

By E. A. McILHENNY

FROM time to time since 1917, there have been published in various natural history journals detailed records of birds banded and the retakes of banded birds at my banding station at Avery Island, Louisiana. This station, now in its thirtieth year of continuous operation, is the oldest banding station in the United States, and has, during its thirty years of existence, placed recorded bands on 272,848 birds, mostly migratory wildfowl. From the 272,848 birds banded at Avery Island, return records have been made from all parts of North America either by re-traps or kills of more than 20,000 individuals who have made at least one migration after being banded.

During my thirty years of bird-banding, return records of bands put on at Avery Island have been received from northern South America north to the Arctic Ocean, and from the Atlantic Ocean on the east to the Pacific Ocean and Bering Sea on the west. I annually register more than 2,000 recovery records from birds that have made at least one migration.

During the year 1940, I placed bands on 33,274 birds—principally wildfowl. This is the greatest number I have ever banded in one year. During the past five years, I have banded 132,848 birds, an average of 26,569 a year, representing one hundred and thirty-eight species.

When one has a deep interest in bird banding and operates his banding traps every day in the year, a very close association is had with the birds of the vicinity, and many interesting and unusual data accumulate.

The banding year of 1940 was the most unusual I have ever recorded—not only did I band more birds that year than in any other, but there occurred in January, 1940 the coldest weather and the longest spell of cold weather ever recorded in southern Louisiana. On January 19th, the thermometer recorded 14° above zero. This temperature came with a mixed rain and snow, which, falling on the frozen earth, covered it with four or five inches of ice, which did not melt for eight days. This unprecedented cold drove myriads of birds that usually winter in the northern and central sections of the south to the Gulf Coast, where they remained, and, not having the habit of migrating across the Gulf, made no attempt to go further after reaching the big water. This protracted cold spell with the ground covered with ice, and a total lack of insects caused tremendous mortality among many of our smaller birds who depend

on insects for food. While not many dead birds were observed during the eight cold days, there was observed a great diminution in the number of our regular winter residents after the cold had passed. Both Ruby-crowned and Golden-Crowned Knights, Brown Creepers, Myrtle Warblers, etc. were far less numerous, while Killdeers and Martins were totally absent, and there was a woeful lack of these birds during the winter of 1940–1941.

Many years ago, I had built near my house a long, raised platform, twenty-six feet above the ground. On this platform was arranged housing accommodations for 128 pairs of Martins. Every nesting place has been occupied each spring for many years, the birds usually arriving during the last week of January from their winter home south of the Gulf of Mexico. During the Spring of 1940, not a pair of Martins came to their old haunts. Two male birds arrived, stayed a few days, and then disappeared. During the Spring of 1941, not a single Martin came to Martin Place, the name by which this Martin colony is known. Every individual belonging to this colony evidently perished during the cold of 1940. A careful investigation of the Martin colonies of Louisiana and East Texas during the Spring of 1940 and 1941, proved the nesting birds had almost been exterminated in the narrow strip lying between the Sabine River on the west and the Atchafalaya and Red Rivers on the East. On both sides of this area, the nesting Martins were much fewer in 1940, but almost up to their usual numbers in 1941.

I own quite an extensive cattle range on the prairie north of Avery Island. On this range there has always been a resident population of Killdeer. During the 1940 freeze, many Killdeer were found frozen or so weak from lack of food that they could not fly. In the Spring of 1940, not a single pair of Killdeers nested on my place, and not one was seen. In 1941, not a pair nested, and not one has been seen. A survey of the Killdeer population from the Mississippi River to the Sabine during the Springs of both 1940 and 1941, failed to locate a single nesting pair, and there was apparently a 95% reduction in the winter population in 1940–1941.

There was an unusual abundance of woodcock driven to the coast of Louisiana during this unprecedented cold spell, and as they could be seen running about the edges of the thickets at all times of the day, I thought I would try and catch some of them for banding with a dip net, but as the attempt was not made until the cold snap was almost over, it was not very successful. I then thought I would try catching woodcock at night with a light, and carrying out that thought has been the greatest thrill of all my bird banding experiences. The first time I tried the light, I saw plenty of birds and got close to them, but the net I was using was so small I was not successful in dropping it over the birds.

That night I lay awake thinking about my failure to catch more

of the many birds I had seen and approached quite closely, and the idea came to me to make a larger net with a longer handle. The next day, I procured two dry bamboo poles eighteen feet long and tied their butts firmly together every six inches for six feet of their length. At the point where the highest tie was made, I forced between the poles a small block of wood. Two feet above this spreader, I inserted a second spreader one and one-quarter feet long. Two feet and four inches above the second spreader, a third spreader was put into place. This last spreader had a length of three feet. As each spreader was put into place, the poles were lashed tightly to each end. With the spreaders in place, the small ends of the poles were bent towards each other, and the tips overlapped for two feet were taped and lashed together for strength. This procedure produced a brail above the last spreader seven feet in length and three feet eight inches wide at the widest point, shaped exactly like an oval tennis racket. Over the spread portion I tied securely, stretched taut, a fine mesh of linen thread. This gave me a net with a total length from top to bottom of thirteen feet, and it proved most efficient for the use I intended it—the catching of birds at night on comparatively smooth and open ground.

I fitted two of my six-compartment carrying cages for small birds with cloth tops instead of the wire they are usually covered with, put new batteries in my six-cell electric headlight, and fresh batteries in a powerful flashlight, and, selecting as helpers two men who are agile and quiet walkers, I was ready for the big experiment of catching woodcock at night.

At seven-thirty the evening of January 27, I picked up my helpers and, loading all the paraphernalia into the back of my car, including my banding box, we proceeded to an open level cattle pasture at the foot of the hills, in the soft ground of which I knew woodcock were in the habit of feeding. It must be known that woodcock are nightfeeders, leaving the shade of the thickets, where they rest during the day, as soon as the sun sets, going to open damp pastures, preferably where cattle range, and probing in the soft earth for earthworms, which constitute their principal food.

We had hardly reached the pasture when several woodcock flushed in front of the car. We could see them clearly in the glare of the car's lights, so stopped and made ready for the hunt. Adjusting the headlight, and giving one of the men the hand flashlight, I took the net, while each of my companions picked up one of the carrying-cages, and with lights sweeping the ground a hundred feet or more in front, we were on our way. We had only proceeded a few feet when I saw a woodcock feeding a little way from us. Keeping the bird in the center of the beam from my headlight, I walked quietly to within about ten feet of it, and dropped the big net over it. The bird did not move until the net touched it, and then could

only flutter, as the webbing of the net pinned it down. One of the men hurried up and, placing his hand over the struggling bird from above, held it quiet while the other hand was slipped under the net. The capture was made, and the bird placed in the carrying-cage.

The catching of our first woodcock had been done so quickly and easily that I was highly elated, for I realized my line of reasoning for using the light and big net was working out in perfect sequence. Within twenty-five minutes from the time the first woodcock was captured, I had netted and placed in the carrying-cages twelve more. We then turned back to the car, so that the captured birds might be banded and liberated. Before we reached the car, three more birds were netted, and a number flushed because of our rapid and incautious haste. I feared the birds would injure themselves bumping up and down, in their efforts to escape, but my fears were groundless, as we found all fifteen strong and unhurt, as the aluminum bands were placed on them and they were liberated. We were soon on our way again, this time taking a different direction from the car, and spotting woodcock almost from the start.

Woodcock were not the only birds we saw, but at first I paid no attention to other species, as I was anxious to band as many woodcock as possible. As the evening wore on and unbanded woodcock became scarce, I began catching other birds: killdeer, meadowlarks, Savannah Sparrows, pipits and jack-snipe. All were netted, and four times the collecting boxes were filled and taken to the car, where the birds were banded, recorded and liberated. The excitement of the chase kept us going until a little past midnight, when I began to tire, and we called it a night. I did not realize until the next morning, when the evening's banding records were tabulated, just how many birds we had captured. Then I learned we had banded thirty woodcock, two jack-snipe, three killdeer, thirteen meadowlarks, forty-one Savannah Sparrows, and three pipits,—a total of ninety-two birds.

Besides the excitement of finding and capturing these birds, I learned a number of things I had not before known. First, I learned woodcock's eyes would reflect the light (shine), but only when at a distance of more than 200 feet from the light. The fact that the eye of bird or animal reflects light at night is in direct ratio to their ability to see in the dark. The eyes of all mammals (except humans and monkeys), many reptiles, and all night-flying insects shine at night, if a concentrated light is projected towards them, and these eyes can be seen by anyone carrying a light above their line of vision. If the light is below the line of vision, only eyes reflecting light most brilliantly are visible. The eyes of birds who feed at night reflect light also, and woodcock belong to this category. From the eyes of the other birds taken that first night, not a flicker of light was seen.

I learned an interesting thing about Savannah Sparrows that night, which is — they sleep in small, compact groups on the ground in short grass. When one of these little birds was flushed, if the light was held on the spot from which it arose, often the group could be seen, and several times from four to eight were taken at one drop of the net.

The experience of this first night's banding was a new and interesting game to me, and I eagerly waited for an opportunity of trying it again.

This came a few nights later, and we were again successful, capturing about the same type of birds we had banded on the first night, but it was necessary to examine every bird caught, as many of them wore bands put on during the first night. As the weather moderated, woodcock moved north, and my last banding of these interesting birds was on the night of February 17, when twenty were captured. By that time, however, I had succeeded in banding one hundred fifty-four of these uncommon birds, and had learned much of their feeding and night habits.

After the woodcock left on their northern migration, I concentrated my night efforts on Jack (Wilson) Snipe. These attractive birds are much harder to capture than woodcock, for their eyes do not reflect light, nor do they feed at night. There were plenty of them in the pastures along the edges of the marshes, where the high land and wet lands join, but it was almost impossible to see them, as they lay close on the ground and their plumage blended exactly with the foliage of the winter marshes. I soon learned that the best way to get them was to flush one, then follow its flight with the beam of light. This seemed to confuse the bird, and it would, instead of flying a considerable distance, come to earth comparatively near the point from which it had been flushed. By marking closely the spot at which it came down and walking very quietly, it was almost always possible to locate the bird, and then its capture was easy, for the big net was so light and could be moved so quickly that it was rare for a bird seen on the ground to escape capture.

After the first few evenings of netting and banding birds with the aid of my headlight, I became so fascinated with the sport that I was out two or three times a week, except when the moon was shining brightly. In moonlight it was much harder to see and get close to the birds, because the natural light dims the artificial one.

On the night of March 2, I saw on a level piece of pasture-land, where the grass was very short, a considerable flock of small birds, sitting rather close together. There must have been over a hundred of them on a space not more than fifty feet square. They sat quite still, in small groups, each bird heading towards the center of what appeared to be a rough circle. A closer approach showed the birds to be American Pipits. By keeping on the outside of the flock and

working around it, I succeeded in capturing thirty-eight of the little fellows, and could have captured more, but I had already a number of birds in my carrying cages, and was afraid of crowding them too closely, so went to the car and banded the catch.

Again, on the evening of March 9, I found the same flock of pipits and captured thirty-eight more of them, besides a number of those I had banded on March 2. These were the first pipits I had ever banded in numbers, and I was highly elated over my success.

I continued my night-hunting through the month of March, capturing a good many of the same species I had before taken, including jack-snipe, killdeer, meadowlarks, and Savannah Sparrows, and, keeping a sharp lookout towards the end of the month (when working the wet lands bordering the marshes), for sandpipers, which I knew were due to arrive from South America during the last days of March or early April. On the night of March 30, my sandpiper search was rewarded by the capture of one Stilt Sandpiper, one Solitary Sandpiper, four Pectoral Sandpipers, four Red-backed Sandpipers and one Spotted Sandpiper, besides thirty-five jack-snipe. I had been getting but few snipe before that date, except birds I had previously banded, and this sudden catch of new birds proved that a fresh supply had come in from across the Gulf, with the first migration of sandpipers. Of course, I was greatly excited at capturing this number of species all in one night, none of which I had ever banded before, excepting, of course, the snipe, and went out the next night fully expecting to make a great catch. Unfortunately, a norther had swept down on the South, with a sudden drop in temperature to the frost point, and it was not until some days later that I was rewarded by finding the marshes filled with migrating shore birds.

As soon as I reached the edge of the marsh on the night of April 14, I knew the shore birds had arrived in quantity. A strong southeast wind had been blowing for several days, backing the tide inland to an unusual height. This high tide, and a hard rain, had flooded the marshes, and covered the low lands adjoining them with a couple of inches of water, producing an ideal condition for the concentration of the many shore birds lately arrived on their spring migration from South America to their nesting grounds on the Arctic tundras. Almost at once, after leaving my car, I spotted a large plover-like bird alone on a dry part of the pasture, and although it was some distance away, I was sure it was an Upland Plover. Telling my two companions to stay where they were, I approached the bird so quietly that it did not know danger was near until the net descended over it and it was pinned to the ground. I was so delighted with this capture that we at once returned to the car, banded and liberated the first Upland Plover I had ever seen at night, and the first I had ever banded.

Naturally, after this first capture, so soon after leaving the car, I expected and searched for more plover, but no such luck, for it was not until some days later that others were taken.

When I reached the edge of the shallow water, shore birds of several species were in sight in every direction. I began operation on a mixed flock of Greater and Lesser Yellow-legs. Other species were in evidence, but the yellow-legs stood up so high and looked so large that I went after them and paid no attention to the smaller species. These birds were standing in water one or two inches deep, and a certain amount of splashing was unavoidable while approaching them. At first, I suppose they thought some of the cattle that used the pasture were making the noise in the water, and paid no attention to my approach, as of course the light on my head hid me completely, but after I had caught four of them and put up the flock that number of times, it was harder to get near enough to them to drop the net over one of them. Finally, the flock scattered, and I later found them by ones and twos, and had less trouble in getting them than when they were in flock.

The banding done during the night of April 14 will always be one of my finest experiences in this interesting work, not only for the considerable number of unusual birds banded, but because I banded a number of species I had never before taken. I worked until past midnight and the result was 127 individuals captured. This number included killdeer, meadowlark, Pectoral Sandpiper, Spotted Sandpiper, White-rumped Sandpiper, Greater Yellow-legs, Lesser Yellow-legs, Upland Plover, and Wilson Snipe—the greatest assortment of unusual and rare birds I had ever taken in so short a time.

By now, I was a confirmed night-hunter, and although I continued my daylight banding, I found getting the birds from my traps did not have anything like the exciting appeal that the night-banding gave me, and each day I looked forward to the excitement and mystery of traveling the open pastures in the dark, expecting every minute to see and capture some bird I had not before taken.

Nothing new was taken until the night of April 27, when there showed up in the light beam as I crossed one of the dry pastures, which I hunted nightly, several pairs of dull-red eyes. These, at first, I thought must belong to a family of skunks, as the eyes of these little animals were frequently seen, shining dully as my searchlight swept the countryside, cutting a path of light through the darkness. If, however, the eyes had belonged to skunks, they would have been moving about, as these little animals pay no attention to the light beam, but go about their business of searching for insects as if the light were not in evidence. Walking towards the group of eyes, I was surprised to find they belonged to nighthawks sitting stolidly on the prairie. I captured fifteen of them in a space not more than fifty feet square.

On May 4, I saw a large bird rise ahead of the car and light a little distance in front of us. Stopping the car and adjusting my headlight was the work of a few seconds, then I turned my headlight down the road and was rewarded by seeing two ruby-red eyes that looked as large as dimes shining in the darkness. Quietly walking to the bird, I recognized it as a Chuck-wills-widow. It did not move until the net pinned it to the ground; then it gave out a series of frightened hisses and dull grunts, which continued until it was captured and banded. I later captured three more Chuck-wills-widows and one Whip-poor-will. Neither of these species had been banded at my station before.

I closed my night banding on the night of May 11th, after having hunted birds at night with a headlight twice or three times a week for almost three and a half months. During that time, my records show I banded 1,139 individuals, including:

American Woodcock (*Philohela minor*)	154
Wilson's Snipe (*Capella delicata*)	207
Upland Plover (*Bartramia longicauda*)	5
Killdeer (*Oxyechus vociferus vociferus*)	18
Greater Yellow-legs (*Totanus melanoleucus*)	11
Lesser Yellow-legs (*Totanus flavipes*)	25
White-rumped Sandpiper (*Pisobia fuscicollis*)	12
Pectoral Sandpiper (*Pisobia melanotos*)	46
Red-backed Sandpiper (*Pelidna alpina sakhalina*)	7
Spotted Sandpiper (*Actitis macularia*)	9
Eastern Solitary Sandpiper (*Tringa solitaria solitaria*)	3
Stilt Sandpiper (*Micropalama himantopus*)	4
Eastern Nighthawk (*Chordeiles minor minor*)	62
Eastern Whip-poor-will (*Antrostomus vociferus vociferus*)	1
Chuck-wills-widow (*Antrostomus carolinensis*)	4
American Pipit (*Anthus spinoletta rubescens*)	83
Eastern Savannah Sparrow (*Passerculus sandwichensis savanna*)	264
Southern Meadowlark (*Sturnella magna argutula*)	224

During this same period, I was operating my traps, and daily banded a considerable number of birds, but the daylight work is now a matter of routine, not to be compared in interest or excitement with night-banding.

A phase of hunting at night with a headlight which adds much to its fascination is the number of animals located by the shine of their eyes. Almost every night I would see the eyes of deer, 'coons, 'possums, skunks, minks, rabbits, frogs and alligators. By close observation, one soon learns to identify the species and its sex by the light of the eyes, without ever seeing the body.

The species and total number of birds banded at my Avery Island station during the year 1940, follows:

Pied Bill Grebe (*Podilymbus podiceps podiceps*)	2
Man-o'-war Bird (*Fregata magnificens*)	1
Snowy Egret (*Egretta thula thula*)	2
Louisiana Heron (*Hydranassa tricolor ruficollis*)	2

Lesser Snow Goose (*Chen hyperborea hyperborea*)	4
Blue Goose (*Chen caerulescens*)	165
Fulvus Tree Duck (*Dendrocygna bicolor helva*)	10
Mallard (♂) (*Anas platyrhynchos platyrhynchos*)	1,831
" (♀) (" " " ")	1,652
Common Northern Black Duck (♂) (*Anas rubripes tristis*)	2
" " " " (♀) (" " " ")	1
Mottled Duck (♂) (*Anas fulvigula maculosa*)	52
" " (♀) " " " ")	25
Gadwall (♂) (*Chaulelasmus streperus*)	23
" (♀) (" " ")	10
Baldpate (♂) (*Mareca americana*)	22
" (♀) (" " ")	7
American Pintail (♂) (*Dafila acuta tzitzihoa*)	4,233
" " (♀) (" " " ")	1,474
Green-winged Teal (♂) (*Nettion carolinense*)	212
" " " (♀) (" " ")	86
Blue-winged Teal (♂) (*Querquedula discors*)	1,375
" " " (♀) (" " ")	578
Cinnamon Teal (♂) (*Querquedula cyanoptera*)	5
Shoveller (♂) (*Spatula clypeata*)	32
" (♀) (" " ")	13
Wood Duck (♂) (*Aix sponsa*)	54
" " (♀) (" " ")	38
Redhead (♂) (*Nyroca americana*)	26
" (♀) (" " ")	15
Ring Neck (♂) (*Nyroca collaris*)	2,018
" " (♀) (" " ")	701
Canvasback (♂) (*Nyroca valisineria*)	573
" (♀) (" " ")	282
Greater Scaup (♂) (*Nyroca marila*)	13
" " (♀) (" " ")	5
Lesser Scaup (♂) (*Nyroca affinis*)	3,831
" " (♀) (" " ")	1,500
Buffle Head (♂) (*Charitonetta albeola*)	2
Ruddy Duck (♂) (*Erismatura jamaicensis rubida*)	10
" " (♀) (" " " ")	8
Hooded Merganser (♂) (*Lophodytes cucullatus*)	3
" " (♀) (" " ")	2
Turkey Vulture (*Cathartes aura septentrionalis*)	3
Black Vulture (*Coragyps atratus atratus*)	3,505
Cooper's Hawk (♂) (*Accipiter cooperi*)	2
" " (♀) (" " ")	1
Eastern Pigeon Hawk (*Falco columbarius columbarius*)	1
Eastern Sparrow Hawk (*Falco sparverius sparverius*)	1
Eastern Bob-white (♀) (*Colinus virginianus virginianus*)	3
Purple Gallinule (*Ionornis martinica*)	1
Florida Gallinula (*Gallinula chloropus cachinnans*)	99
American Coot (*Fulica americana americana*)	1,742
Killdeer (*Oxyechus vociferus vociferus*)	23
American Woodcock (*Philohela minor*)	186
Wilson Snipe (*Capella delicata*)	207
Upland Plover (*Bartramia longicauda*)	5
Spotted Sandpiper (*Actitis macularia*)	9
Eastern Solitary Sandpiper (*Tringa solitaria solitaria*)	3
Greater Yellow Legs (*Totanus melanoleucus*)	14
Lesser Yellow Legs (*Totanus flavipes*)	30

Pectoral Sandpiper (*Pisobia melanotos*)	46
White-rumped Sandpiper (*Pisobia fuscicollis*)	12
Red-backed Sandpiper (*Pelidna alpina sakhalina*)	7
Stilt Sandpiper (*Micropalama himantopus*)	4
Semipalmated Sandpiper (*Ereunetes pusillus*)	11
Southern Screech Owl (*Otus asio asio*)	1
Chuck-will's-widow (*Antrostomus carolinensis*)	4
Eastern Whip-poor-will (*Antrostomus vociferus vociferus*)	1
Eastern Night Hawk (♂) (*Chordeiles minor minor*)	32
" " " (♀) (" " " ")	32
Chimney Swift (*Chaetura pelagica*)	178
Red-bellied Woodpecker (♂) (*Centurus carolinus*)	18
" " " (♀) (" " ")	11
Eastern Kingbird (*Tyrannus tyrannus*)	1
Tree Swallow (*Iridoprocne bicolor*)	57
Bank Swallow (*Riparia riparia riparia*)	17
Barn Swallow (*Hirundo erythrogaster*)	29
Florida Blue Jay (*Cyanocitta cristata florincola*)	116
Eastern Winter Wren (*Nannus hiemalis hiemalis*)	1
Carolina Wren (*Thryothorus ludovicianus ludovicianus*)	1
Eastern Mockingbird (*Mimus polyglottos polyglottos*)	127
Brown Thrasher (*Toxostoma rufum*)	46
Eastern Robin (*Turdus migratorius migratorius*)	2
Eastern Golden-crowned Kinglet (*Regulus satrapa satrapa*)	3
Eastern Ruby-crowned Kinglet (*Corthylio calendula calendula*)	1
American Pipit (*Anthus spinoletta rubescens*)	83
Loggerhead Shrike (*Lanius ludovicianus ludovicianus*)	17
Starling (*Sturnus vulgaris vulgaris*)	188
Myrtle Warbler (*Dendroica coronata*)	42
Eastern Meadowlark (*Sturnella magna magna*)	268
Gulf Coast Red-wing (♂) (*Agelaius phoeniceus littoralis*)	2,120
" " " (♀) (" " ")	311
Rusty Blackbird (♂) (*Euphagus carolinus*)	14
" " (♀) (" ")	5
Brewer's Blackbird (♂) (*Euphagus cyanocephalus*)	3
Boat Tailed Grackle (♂) (*Cassidix mexicanus major*)	349
" " " (♀) (" " ")	829
Purple Grackle (♂) (*Quiscalus quiscula quiscula*)	378
" " (♀) (" " ")	70
Florida Grackle (♂) (*Quiscalus quiscula aglaeus*)	2
Bronzed Grackle (♂) (*Quiscalus quiscala aeneus*)	39
" " (♀) (" " ")	18
Eastern Cowbird (♂) (*Molothrus ater ater*)	409
" " (♀) (" " ")	160
Louisiana Cardinal (♂) (*Richmondena cardinalis magnirostris*)	87
" " (♀) (" " ")	43
Eastern Savannah Sparrow (*Passerculus sandwichensis savanna*)	294
Slate-colored Junco (♂) (*Junco hyemalis hyemalis*)	4
" " " (♀) (" " ")	2
White-throated Sparrow (*Zonotrichia albicollis*)	42
Eastern Fox Sparrow (*Passerella iliaca iliaca*)	4
Swamp Sparrow (*Melospiza georgiana*)	15
Ring-neck × Scaup, (*Hybrid*) (♂)	1
Pintail × Gadwall (*Hybrid*) (♂)	1
Mallard × Black Duck (*Hybrid*) (♀)	1
	33,274

Avery Island, Louisiana.

FAILURE OF HORNED LARKS TO NEST IN MARCH

BY WILLIAM MONTAGNA

DURING the years of 1938, 1939, 1940 and 1941 I have made an extensive study of the Horned Larks, *Otocoris alpestris*, which occur in Ithaca, Tompkins County, New York. Since this bird was studied thoroughly by Gayle B. Pickwell (1931), I concentrated my attention on matters which he treated lightly or where my own observations conflicted with his. A phase of the study which I found of great interest was the failure of the birds to nest in March, when Pickwell (1931) says that they nest, "as a rule, in March." And Sutton (1927) found mated pairs in Pennsylvania as early as February 20.

During the four years of observation I found not only that the birds were not nesting in March, but that they showed very little evidence of sexual maturity. A large number of females collected during this time showed only a negligible enlargement of the ovaries, and the bellies, which in birds ready for nesting should be swollen and bare, was, as a rule, still lightly feathered. Of course, some individuals had larger ovaries than others, but only one female, collected on March 18, 1938, had the gonads decidedly enlarged. But even in this case the brood patch was not swollen and the follicles were only one fourth the size that should be in breeding birds. In 1940 it was not until April that females showed an approach to maturity. On the other hand, males collected as early as February had the gonads rather large. Testes of birds from this month measured from 3 to 5 mm., and one bird collected in February, 1938 measured 6.5 mm. Gonads of March males from 1939 measured, as an average, only 5 mm., showing that they were in no condition for nesting. Males and females collected late in March, 1940 and 1941 had even less enlarged gonads. Sexually matured males taken in late April and June had tests which measured from 10 to 15 mm.

Of more than one hundred females trapped in March of 1940 and 1941, not a single bird had a brood patch well defined. It appears from this evidence that there was a failure of sexual maturity in these birds during the four years of observation.

One may venture to guess, since they have been known to nest in March on previous years, that this failure might have been caused by the severity of the weather, or, by the inadequacy of the environment for breeding caused by weather conditions. Even if the birds had wanted to breed there was hardly any ground available which would have been suitable for nesting sites. March snows during the past four years have been very heavy and consistent.

As the snows melted and conditions for nesting became more

favorable, there was a marked rapidity in the sexual maturity of both sexes. This was noticed particularly in the end of March of 1938 and 1939 and the end of the first week of April of 1940. On April 6, 1940 a pair was taken near their freshly begun nest, which at that time consisted of only a scrape lined with a few lichens. However, the ovary of this female was not yet fully enlarged.

In my work with *Otocoris alpestris praticola*, I trapped male birds which, from their bright yellow superciliary line appeared to be *O. a. alpestris*. However, I was able to distinquish these specimens as *praticola* not only by their smaller measurements and duller dorsal coloration, but also by the fact that their gonads were very much enlarged. Specimens of *O. a. alpestris* taken as late as March 13, the usual date of their disappearance, show hardly a trace of enlargement of the gonads. Not a single specimen collected had the testes larger than 2 mm. The ovary of one March female, although minutely larger than the winter dormant gonad, showed hardly any obvious change.

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THE INSECT NET AS A TOOL OF THE BIRD BANDER

BY RICHARD B. FISCHER

DURING the summer of 1940 I had occasion to take a course in field zoology, and included in the equipment for the course was an insect net. I believe it was purchased from Ward's Natural Science Establishment for the price of one dollar and twenty-five cents. Next to my traps, this net has become my most valued piece of bird-banding equipment.

Prior to acquiring this net, I had discovered that it was a simple matter to capture Barn Swallows (*Hirundo erythrogaster*) at night if one used a long-handled net and a three or five-celled flashlight. I used a trout landing net lashed to a long, light pole, and secured a number of adult birds in the summer of 1939 and in June of 1940. The landing net was good—I think I caught more birds than trout with it—but the insect net proved to be infinitely better. For one thing, its sac is thirty-seven inches deep, whereas the trout net has a depth of only fourteen inches. This deeper sac has one especially desirable advantage over a shallow one; namely, it is possible to catch two, three, and even four Barn Swallows at a time with it. While capturing swallows at night in a barn, I have often been up in the gable, hanging on with one hand and wielding the net with the other. Now climbing up into the gable of a barn is at best a tiring and time-wasting procedure, hence one would try to net as many birds as possible before having to climb down to place them in the gathering cage. By having a deep sac, however, you can capture one swallow and then turn the sac on the net handle a few times, thus preventing the bird from escaping. When another bird approaches (attracted by your light) wait until it is within reach. Then untwist the net quickly, catch the bird, and close the net as before. The bander must expect to lose some birds at first, but a little practice will make one very proficient in manipulating the net.

Another good feature of the insect net is its larger mouth (twelve and one-half inches across), with advantages of size which are self-evident. The much finer mesh prevents birds from becoming entangled in it (formerly requiring that a bird be cut out) and, in addition, prevents the escape of the larger ectoparasites. Its ample handle gives one a reach of almost six feet. Lastly, it is stronger for its weight than the heavier trout net.

In addition to catching swallows at night with it, the insect net is very useful for capturing birds nesting in boxes or crannies in buildings. By watching the parents as they carry food to their young, one can determine about how much time the birds spend at the nest. If the bander is careful, he may approach quite close without arousing the suspicions of the parents. Having determined

how much time is available, the bander may be able to sneak up to the nest and slip the net over the box (or across the face of the cranny), or he may have to run up and use his net speedily and deftly. When it is possible to do so, the nest should be approached from behind, for then the bird cannot see you coming, and it is much less likely to hear you By using this method, I have captured many adult House Wrens (*Troglodytes a. ædon*), and one pair of Bluebirds (*Sialia s. sialis*), in addition to several species of swallows.

Occasionally a bird will refuse to come out of a house after the net has been placed over it; I had a great deal of trouble with the Bluebirds, especially the female. Since the net has such a large opening, it may be slipped over one-half of the house with, of course the front of the house facing the bottom of the sac. The bander is then free to leave it hanging there till the bird decides to emerge, or he may tap on the back of the box thus frightening it out. Whichever method is used, it is best to draw the net sac out on a horizontal plane so that the emerging bird goes to the bottom of the sac. Unless this is done many birds will escape. Furthermore, it is advisable that one close his hand around the sac, behind the bird, as soon as possible. Should a hole be torn in the net while in the field, it can be closed merely by tieing a knot in the particular region of the sac in which the hole is located.

Most bird banders have at some time or other stared into a small bush at a parent bird on its nest. Though the sitting bird was only inches away, it was never possible to reach in and catch it. I have found that it is possible to capture a good proportion of these incubating or brooding birds with the insect net. The method is simple. By standing on the same side of the bush during several flushings of the sitting bird, it will be noticed that the bird usually leaves by the same route each time. When once you know at which point in the bush the bird makes its exit, approach the sitting bird cautiously, taking care that it sees as little of your net as possible. When close enough, raise the net so that it "covers" or rather blocks the exit, at the same time suddenly shaking the branches behind the bird. This operation must be done very quickly, and timed so that the net reaches the exit a fraction after you have frightened the sitting bird. The bird does not expect its egress to be blocked, so it travels the route that it is accustomed to use when leaving the nest. During that brief interval after the bird has flushed, your free hand, the nest, and the net should all be in a straight line. If the operation is done correctly, the fleeing bird will almost always fly into the net. Like catching the fourth Barn Swallow with three already in the net, this is a procedure which requires practice. Capturing birds by this method is especially time-saving when it is desired to catch a bird at a distance from one's station without having to wait for it to enter a trap.

In addition to being a valuable tool for catching birds, the insect net is especially helpful in capturing the parasitic flies which live on the birds. These Hippoboscidae, as they are called, are difficult to catch because they are apparently able to detect the presence of your hand, and soon fly off the bird. I was anxious to secure some of these elusive little creatures, and was advised to ruffle a captured bird's feathers before a closed window. The flies would go to the window where they could easily be caught. This method worked well when there were still some flies on the bird, but I discovered that most or all of the insects had escaped before I could reach a window. On June 18, 1941, I discovered what I believe to be the most efficient method of securing these Hippoboscid flies. I had just released an adult female Song Sparrow (*Melospiza m. melodia*), captured by the method described above, when something prompted me to examine the net for parasites. I held the sac up against the sky, and was delighted to discover a Hippoboscid in it. This gave me an idea.

A few hours later I caught a young Catbird (*Dumetella carolinensis*) which had just left the nest and which was rather heavily parasitized by Hippoboscidae. Several flies escaped before I thrust the bird into the net, but by allowing this bird to flutter about in the closed sac, the remaining flies left the bird and were imprisoned in the net. A few drops of alcohol from the specimen vial were poured on the insects, thus incapacitating them so that they could be transferred to the vial without fear of their escaping. A few minutes later I captured a young Robin (*Turdus m. migratorius*) which I immediately dropped into the net. Two flies came off the bird and were secured as before. This is apparently the best way to capture these insects, for they have practically no chance to escape.

A final though less important use of such a net is as a cage for young birds. There are times afield when it is desirable to band a number of young or juvenile birds all at one time. At such times it is not usually convenient to carry a gathering cage, but the net will be found to serve almost as well.

These are some of the ways in which the insect net has proved to be useful as a tool of the bird bander. Those who make a habit of carrying one with them in the field, as I do, will undoubtedly discover other applications for it.

140–19 Beech Ave., Flushing, New York.

RETURNS FROM BANDED BIRDS: SOME LONGEVITY RECORDS OF WILD BIRDS

BY MAY THACHER COOKE

RECORDS indicating the possible life-span of birds in the wild are accumulating in the return file for banded birds. In *Bird-Banding*, vol. viii, 1937, p. 52–65, a number of these were published. The expressed interest in this phase of bird life, together with the increased amount of material, seem to justify further publication on this subject. These papers by no means exhaust the subject; probably as many more equally interesting records could be found.

As in the previous article, a bird must have been at least five years old at its latest report to be included in the list. In the case of Common Terns, the minimum has had to be made ten years, and few ducks less than ten years old have been included. No special effort has been made to "dig out" the complete records of birds that have returned several times to the banding station, but when the record has been supplied on the return card by the operator it has been used.

In the previous paper, comment was made on the scarcity of records of five-year old Robins and Song-Sparrows. The lapse of time and further study have, however, revealed several. As these records of banded birds accumulate, it may become necessary to revise some of our ideas about the life span of wild birds, especially of the passerine species. Some birds that regularly migrate long distances are showing remarkable tenacity of life.

It is probable that the failure properly to record the replacing of worn bands has caused the loss of some long life records. Some coöperators fail to record on their schedules the number of the band that was replaced. In such a case, if the bird is reported again, only the date when it was rebanded is known. When the record of rebanding is given *only* on the return card, the record of the bird is lost. This latter may account for the inability to find the banding data for some recovery records.

As in previous articles in this series, an asterisk preceding a number indicates that the bird was known to be a bird of the year when banded.

WHITE PELICAN. *Pelecanus erythrorhynchos*

465175, banded at Dafoe, Sask., on July 7, 1932, by J. A. M. Patrick, was shot 3 miles northwest of Bunkie, La., about October 8, 1937.

*A715025, banded at Yorktown, Sask., on July 9, 1931, by J. A. M. Patrick, was found dead near Arrow Rock, Mo., May 1936.

*A716811, banded at Yellowstone Park, Wyo., on July 12, 1932, by B. H. Thompson, was shot at McAllister, Mont., August 5, 1940.

*A725090, banded at Malta, Mont., on June 21, 1933 by Vernon L. Marsh, was "found" at Pelican Rapids, Man., April 25, 1938.
*A715826, banded near Dafoe, Sask., on July 7, 1932, by J. A. M. Patrick, was probably found dead in Caddo County, Okla., April 4, 1937.
*A724577, banded at Dafoe, Sask., on June 27, 1932, by F. G. Bard, was "picked up" at Archerwill, Sask., November 17, 1938.
*34-701037, banded at Yellowstone Park, Wyo., on June 23, 1934, by R. W. Toll, was shot in the Montreal Lake Region, Sask., June 25, 1939.

BROWN PELICAN. *Pelecanus occidentalis*

A714400, banded at St. Petersburg, Fla., on March 13, 1933, by Forrest M. Stott, was caught and released at same place December 18, 1938.
A718478, banded at St. Petersburg, Fla., on April 3, 1932, by Forrest M. Stott, was caught and released at same place December 12, 1937.
A718482, banded at St. Petersburg, Fla., on November 20, 1932, by Forrest M. Stott, was caught and released at same place December 13, 1936, and December 12, 1937.
*34-702984, banded at Pelican Island, Fla., on November 12, 1934, by E. M. Davis, was found dead at Daytona Beach, Fla., March 24, 1939.
*A729627, banded at Brevard Reservation, Fla., on October 28, 1933, by J. C. Howell, was found dead at Cocoa, Fla., March, 1939.

GANNET. *Moris bassana*

20725–, banded at Bonaventure Island, Quebec, on July 31, 1922, by H. L. Stoddard, was shot at Port-aux-Basques, Newfoundland, April 14, 1939.

DOUBLE-CRESTED CORMORANT. *Phalacrocorax auritus*

*A700187, banded at Waubay Lake, S. Dak., on June 13, 1929, by W. H. Over, was found dead at Big Stone Lake, Minn., October 9, 1937.
*A700217, banded at Waubay Lake, S. Dak., on June 13, 1929, by W. H. Over, was shot at Bath, Ill., November 6, 1938.
*A702711, banded at Waubay Lake, S. Dak., on June 28, 1929, by A. R. Lundquist, was probably shot in Terrebonne Parish, La., January 20, 1937.
A711048, banded at Waubay Lake, S. Dak., on June 23, 1931, by A. R. Lundquist, was killed near Alexandria, La., October 23, 1938.
*A7119(—), banded in Saguenay County, Que., on July 18, 1931, by H. F. Lewis, was caught in mullet net near Tampa, Fla., February 10, 1937.

GREAT BLUE HERON. *Ardea herodias*

C622115, banded at Malta, Mont., on June 20, 1933, by Vernon L. Marsh, was caught in a fence at Colby, Kans., June 18, 1938.

LOUISIANA HERON. *Hydranassa tricolor ruficollis*

*ABBA37507, banded at Avery Island, La., on August 13, 1920, by E. A. McIlhenny, was retrapped at same place July 13, 1934.
*ABBA37537, banded at Avery Island, La., on August 13, 1920, by E. A. McIlhenny, was caught in muskrat trap at same place, January, 1937.
*A-540597, banded at Heron Island, Charleston County, S. C., on June 11, 1932, by E. M. Burton, was shot 4 miles from port of Caibarien, Cuba, October, 1940.

BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax hoactli*

*568310, banded at Chilmark, Mass., on June 8, 1932, by G. D. Eustis, was shot near Kennett Square, Pa., November 3, 1938.
*658639, banded at Speonk, L. I., N. Y., on June 5, 1929, by Le Roy Wilcox, was found dead at same place September 21, 1938.
*658763, banded at Speonk, L. I., N. Y., on May 28, 1928, by Le Roy Wilcox, was found dead at Center Moriches, L. I., N. Y., January, 1938.

*B674514, banded at Squibnocket, Gay Head, Mass., on July 1, 1932, by G. D. Eustis, was probably killed at Beaufort, S. C., September 10, 1938.

CANADA GOOSE. *Branta canadensis*

236079, banded at Battle Creek, Mich., on July 12, 1931, by M. D. Pirnie, was found dead at the same place February 7, 1938.

A701342, banded at Muskegon, Mich., on April 6, 1931, by M. D. Pirnie, was found crippled at Lake Mattamuskeet National Wildlife Refuge, New Holland, N. C. March 1, 1938.

BLUE GOOSE. *Chen caerulescens*

A723431, banded at Avery Island, La., on December 14, 1932, by E. A. McIlhenny, was shot in Jefferson County, Tex., November 15, 1938.

A729505, banded at Chenier au Tigre, Vermilion Parish, La., on December 17, 1933, by E. A. McIlhenny, was shot at Hannah Bay, James Bay, Ont., in October, 1938.

C608502, banded at Avery Island, La., on November 11, 1933, by E. A. McIlhenny, was retrapped November 26, 1938.

34-702524, banded at Chenier au Tigre, Vermilion Parish, La., on December 2, 1934, by E. A. McIlhenny, was found dead at Lake Marsh, Hamlin County, S. Dak., May 14, 1940.

MALLARD. *Anas platyrhynchos*

101952, banded at Cuivre Island, Peruque, Mo., on January 15, 1923, by L. V. Walton, was shot at Montreal Lake Post, Hudson's Bay Company, Sask., October, 1937.

A654548, banded at Ellinwood, Kans., on January 30, 1931, by F. W. Robl, was shot at Alviso, Calif., on November 13, 1939.

A698484, banded at Lake Malheur National Wildlife Refuge, Oreg., on October 17, 1930, by G. M. Benson, was shot at Nampa, Idaho, November 24, 1938.

BLACK DUCK. *Anas rubripes*

496164, banded at Oakdale, L. I., N. Y., on March 10, 1927, by Alvah G. Allen, was caught in muskrat trap near Starks, Maine, in the spring of 1936.

PINTAIL. *Dafila acuta*

379625, banded at Ellinwood, Kans., on March 5, 1927, by F. W. Robl, was killed at Mexico, D. F., Mex., October 5, 1938.

567488, banded at Waco, Tex., on February 2, 1928, by Wm. P. Sparks, was shot at Gothenburg, Nebr., about October 22, 1937.

600730, banded at Ellinwood, Kans., on March 4, 1928, by F. W. Robl, was killed at Mexico, D. F., Mex., December 5, 1938.

601204, banded at Lake Merritt, Oakland, Calif., on December 15, 1927, by E. W. Ehmann, was retrapped November 18, 1935, and rebanded with No. 36-618807, and again retrapped October 17, 1940.

A619898, banded at the National Bison Range, Mont., on November 22, 1928, by Frank H. Rose, was retrapped February 10, 1936 at Midland, Texas, and rebanded by H. M. Bayer, and was shot at Torreon, Coahuila, Mex., in April, 1938.

A620179, banded at Lake Merritt, Oakland, Calif., on January 17, 1929, by E. W. Ehmann, was shot at Alvarado, Calif., October 15, 1938.

A620259, banded at Lake Merritt, Oakland, Calif., on January 17, 1929, by E. W. Ehmann, was rebanded January 16, 1931 with No. A691857 and was again retrapped October 17, 1940.

RED-TAILED HAWK. *Buteo borealis*

*309002, banded at Muscow, Sask., on June 29, 1924, by R. H. Carter, Jr., was killed at Ethel, La., January 17, 1938.

*309014, banded at Muscow, Sask., on June 20, 1926, by R. H. Carter, Jr., was killed at Burton, Tex., January 23, 1937.
*309020, banded at Muscow, Sask., on July 3, 1927, by R. H. Carter, Jr., was shot near Greenwood, Ark., about January 3, 1938.
320501, banded at Hamilton, Kans., on November 9, 1924, by G. C. Rinker, was killed in April 1937 at El Dorado, Kans.
320517, banded at Hamilton, Kans., on December 12, 1924, by G. C. Rinker, was shot at Calvin, Okla., November 28, 1936.
*661179, banded at Muscow, Sask., on June 30, 1929, by John R. Carter, was killed at Belzoni, Miss., about November 15, 1936.

RED-SHOULDERED HAWK. *Buteo lineatus*

*C612964, banded near Dover, Del., on May 30, 1931, by H. Buckalew, was shot at Salisbury, Md., October 17, 1938.

BALD EAGLE. *Haliaeetus leucocephalus*

*236059, banded at Sault Ste. Marie, Mich., on June 20, 1929, by M. J. Magee, was caught in a beaver trap and released, at Gould City, Mich., about April 21, 1937.

MARSH HAWK. *Circus hudsonius*

*A402544, banded at Sharline, Ohio, on June 1, 1929, by L. D. Miller, was killed at Marion, Ill., November 30, 1936.
B607800, banded at Field Museum, Chicago, Ill., on June 26, 1932, by W. I. Lyon, was captured at Whiting, Ind., September 1, 1940.
*B621403, banded at Toledo, Ohio, on June 22, 1932, by Louis W. Campbell, was probably killed at Walnut Ridge, Ark., December 14, 1937.

DUCK HAWK. *Falco peregrinus anatum*

*312013, banded at Woronoco, Mass., on June 7, 1926, by H. E. Woods, was shot at Winsted, Conn., about April 10, 1933.

RUFFED GROUSE. *Bonasa umbellus*

A509692, banded at Copemish, Mich., on February 3, 1933, by F. W. Hatch, was retrapped at place of banding March 9, 1937, February 26, 1938, and April 1, 1939.

FLORIDA GALLINULE. *Gallinula chloropus cachinnans*

A511251, banded at Avery Island, La., on March 17, 1933, by E. A. McIlhenny, was retrapped at same place September 24, 1938.

COOT. *Fulica americana*

A551348, banded at Thief Lake, Minn., on October 6, 1933, by M. K. Nelson, was shot at Hales Corners, Wis., October 24, 1938.
A554298, banded at Lake Merritt, Oakland, Calif., on December 8, 1932, by E. W. Ehmann, was rebanded with 35–539747, November 17, 1936 and again retrapped at same place November 5, 1937.
B651775, banded at Lake Merritt, Oakland, Calif., on January 27, 1932, by E. W. Ehmann, was rebanded with 35-513073 February 6, 1935, and again retrapped at same place November 5, 1937.

(*To be continued*)

GENERAL NOTES

A Banded Red-backed Sandpiper.—While collecting birds on Hog Island, Northampton County, Virginia, on April 2, 1941, the authors took a female Red-backed Sandpiper, *Erolia alpina sakhalina*, from a flock of at least five thousand birds. The bird was found to be banded with U. S. Biological Survey band number 36-229093. Mr. Frederick C. Lincoln, In Charge of Distribution and Migration of Birds gave us the following history of the bird: it was banded October 14, 1936 by Dr. Oliver L. Austin at North Eastham, Cape Cod, Massachusetts. So our bird was at least five years old.—WILLIAM MONTAGNA and WILLIAM A. WIMSATT, Laboratory of Ornithology, Fernow Hall, Cornell University, Ithaca, New York.

Descriptive Notes on a Catbird Nest.—Favorable circumstances provided an opportunity to observe the behavior of one pair of Catbirds (*Dumetella carolinensis*) throughout the nesting cycle. Since it is unlikely that I will be able to make additional observations "for the duration", it seems desirable to record these notes at this time. The pair of birds built a nest in the bushes near a house in Wilmette, a residential suburb of Chicago. The literature concerning catbirds contains little which duplicates these observations. Hence no attempt is made to correlate the literature or analyse the description. Neither bird was banded. The identification of sex was based on the presence of the brood patch in the female and also on behavior.

On May 21, 1941 two Catbirds flew back and forth across the yard frequently. Neither carried nesting material. A catbird had been singing vigorously for the past week. Nest building was observed on May 23. One bird (female?) carried and arranged the nesting material while the other (male?) followed and sat on the nearby porch. The nest was placed about ten feet above the ground in a dense bush. The back door of a house was about eight feet away; persons and a dog went in and out. The dog was fed on the ground about five feet from the nest bush. For four days, beginning on May 25, an egg was laid in the morning about 8 A.M.

The incubation period was twelve days. The female incubated exclusively; she remained on the nest for about 20 minutes and then was off for about five minutes. The identification of the female was made by the presence of the brood patch which was visible under favorable circumstances. The female appeared to be slightly larger than the male. After the birds had been observed for some time it became obvious that the male used certain perches and the female used others. While the female was on the nest the male watched from a nearby telephone wire or went off to feed. During the inattentive periods of the female the male always guarded the nest, perching a few feet away. The male drove off English Sparrows and continued to sing loudly but with decreased frequency. During the incubation period three behavior patterns are notable. (1) The male sings in the usual loud manner occasionally but frequently sings a weak warbling song. The notes are very similar to the usual song but the volume is greatly diminished. One must be near to hear the song. (2) Several times the male and female perched on the telephone wire and touched or rubbed bills. (3) Commonly the male and female fluttered or quivered the wings. This fluttering occurred when the birds appeared to be excited, as, for example, after I had disturbed the nest or when the female returned after feeding.

Two young hatched on June 8 during a violent rain and wind storm which lasted throughout the day. The fate of the other two eggs is unknown. No trace of eggs or young was found when the weather cleared. During the nestling period the female brooded the young when necessary, especially at first. The male began to bring in food at once and either fed the young directly or gave the food to the female. She apparently never ate it but passed it on to the young.

The male always used his favorite perch when approaching the nest. The adults continued the billing and wing fluttering. Both birds waited for the young to defecate after feeding and then carried away the feces. The male sang occasionally.

The young left the nest on June 19 at 8 P.M. after a fledging period of 11 days. A small boy and a dog, although intending no harm, probably scared the young out of the nest. The young were hardly able to hang onto the twigs of the bush when placed up near the nest. Probably the fledging period in this case should be counted as 12 days. On the morning of June 20 the parents were feeding the young near the nest. The birds were not seen again.

Data on the incubation and fledging period of a pair of Catbirds at the Edmund Niles Huyck Preserve at Rennselaerville near Albany, New York State, are here presented for comparison. The first egg was laid on June 15, 1940 and the last of the four on June 18. On July 1 at 8 A.M. all young had hatched. On July 12 the young were all out of the nest at 8 A.M. The incubation period and the fledging period were each twelve days in this case.

No observations were made on territorialism of the Catbird. Nevertheless the behavior appeared to be consistent with the territory concept.—DAVID E. DAVIS, 721 Elmwood Avenue, Wilmette, Illinois.

Recovery of Bluebirds Banded as Fledglings. During the last nine years I have banded at Princeton, Massachusetts thirteen male bluebirds (*Sialia sialis sialis*), seventeen females and 127 fledglings. Of these, four males and four females have been trapped breeding a second season and two of the females and three of the males were trapped breeding two years after banding. None of the fledglings have returned to nest at my station.

Two of the fledglings, however, have been recovered elsewhere and these two returns are of extreme interest. No. 34-100531, ♀, banded in a nest box at Princeton on May 31, 1937 was trapped breeding at the Wharton banding station in Groton on June 18, 1938. Groton is approximately 20 miles northeast of Princeton. The second fledgling F117940 ♂, banded in a nest box at Princeton on July 21, 1936 was caught by a cat in Orient, Maine on July 28, 1941, five years later. Orient, Maine is in Aroostook County close by the New Brunswick line, 305 miles northeast of Princeton. It seems very probable that this bird was breeding in Maine when killed.

Both of these birds on their first return journey from the south apparently were heading in the general direction of Princeton but went on beyond in a northeasterly direction before selecting a breeding territory.

It is interesting to note that the only other published information on recoveries of fledgling bluebirds that I have been able to find are all for birds recovered in their natal area. These records are given below.

Place of Banding	*No. Banded*	*Returns*	*Reference*
Chesley, Ont.	83	1 ♂	Bird Banding, 12 : 25
Cape Cod, Mass.	142	2 ♂ + 1 ♀ + 1	Bird Banding, 5 : 40
Nashville, Tenn.	521	15 ♀[1]	Wilson Bull., 52 : 188

As bluebirds are permanent residents in Tennessee, the Nashville fledglings do not represent a return from migration.—LAWRENCE B. CHAPMAN, 1 Woodridge Road, Wellesley, Massachusetts.

[1] Males not trapped.

RECENT LITERATURE

Reviews by Margaret M. Nice

BANDING

1. Report of the Vogelwarte at Sempach for 1939 and 1940.—(Jahresbericht der Vogelwarte Sempach für die Jahre 1939 und 1940.) A. Schifferli. 1941. *Ornithologische Beobachter*, 38: 57–74. In the two years over 17,000 birds of 124 species were ringed; 4,000 of these were nestlings. Five Snow Finches (*Fringilla montifringilla*) trapped in Switzerland from January to March 1939 were taken the following winter in Jugoslavia, Rumania, Italy, Bohemia and Denmark!

2. Unusual Behavior of a Banded Cardinal.—J. B. Young. 1941. *Wilson Bulletin*, 53: 197–198. A male *Richmondena cardinalis* evinced such antipathy to his band that he appeared to spend all his time biting at it.

3. (Bronzed Grackle 16 years old.)—R. T. Gordon. 1941. *Conservation Volunteer*. St. Paul, Minnesota 2(9): 72. A *Quiscalus quiscula aeneus* banded in South Dakota August 17, 1924 was found in Minnesota in October, 1940.

For other studies in which banding was used see Nos. 7, 13, 17, 22, 25, 27, 30 and 53.

MIGRATION

4. The Spring Migration of Oldsquaws and Common Scoters near Helsingfors.—(Der Frühlingszug von *Clangula hyemalis* (L.) und *Oidemia nigra* (L.) bei Helsingfors.) G. Bergman. 1941. *Ornis Fennica*, 18:1–26. A sudden migration of these ducks occurs in May against a northeast wind, perhaps correlated with electrical conditions in the atmosphere. Tables and diagrams are given, as well as a long bibliography.

5. The Migration of the Common Scoter in the Interior of Finland.—(Ueber den Zug der Trauerente, *Oidemia n. nigra* (L.) im Inneren Finlands.) A. Pynnönen. 1941. *Ornis Fennica*, 18:36–39. The spring migration takes place in May; in July the males start to return, while the females and young migrate in October and November.

6. Animal Migration—Periodic-Response Theory.—Angus M. Woodbury. 1941. *Auk*, 58:463–505. A long discussion of migration, citing many American and some English authors, but none in foreign languages. The author's "new" "periodic-response theory is based upon the idea that the periodic events of the environment have acted as initiators, moulders and regulators of the migration phenomena by first inducing migratory-habit patterns within the limits of the hereditary mechanism possessed by the animal, then by natural selection perpetuating any hereditary mechanism developed by independent agencies that tended to transform the habit into an hereditary pattern." pp. 291–292.

LIFE HISTORY

7. The Erect-crested Penguin (*Eudyptes sclateri*) **Buller.**—L. E. Richdale. 1941. *Emu*, 41:25–53. Another notable Penguin study by Mr. Richdale. A pair were found nesting on Otago Peninsula, New Zealand, accompanied by a handsomer male—"No. 3"—that dominated the pair so severely that the second year the female could not go to the nest to relieve her male until the author caught No. 3. The first year the egg was stolen; the next year, after 9 weeks of incuba-

tion, the egg proved to be addled and was "attacked" by the parents. The following winter both males disappeared and the female remained alone. The birds "were the most affectionate pair of penguins I have ever known and, as long as I stayed three feet or more away, they took no notice of me and carried out their various ceremonies unperturbed." p. 36. The author banded the birds and for 8 weeks camped beside their nest and that of a pair of *Megadyptes antipodes* (1941). Excellent photographs are given of the 3 birds, of the pair molting, and of various behavior patterns, especially the "ecstatic ceremony." The parents stayed for long periods on shore without going to the sea to feed—18 to 25 days at a time. All three birds had brood patches, those of the males' being smaller than that of the female's. The pair changed places several times during the 24 hours. The molt took 24 days, during which time the birds were "quite lively", the male gathering sticks for the nest. All courtship activities took place at the nest site.

8. The Gould Petrel of Cabbage Tree Island.—K. A. Hindwood and D. L. Serventy. 1941. *Emu*, 41:1–20. The numbers of *Pterodroma l. leucoptera* on this island have been much reduced since 1910 when 40 eggs, 20 adults and some nestlings were collected. Eggs are laid in late November; incubation takes about six weeks, fledging at least two months. The gonads regress very rapidly "after pairing has been accomplished"; if the egg is taken, it is not replaced, but the pair may still frequent the colony. The Bird-Lime Tree (*Pisonia Brunoniana*) causes the death of a number of birds, for the sticky seeds fall to the ground and the petrels become hopelessly entangled in them.

9. Studies of Waterfowl in British Columbia. Greater Scaup Duck, Lesser Scaup Duck.—J. A. Munro. 1941. *Canadian Journal of Research*, 19: 113–138. *Nyroca marila* is an abundant migrant and winter resident; the sex ratio in winter is "predominantly male"; *Chara* is the chief food. *Nyroca affinis* nests commonly on shallow lakes. Females with young combine broods; at the approach of a canoe one female swims "rapidly towards the canoe, sometimes flat on the surface, again on her side so that the white underparts are exposed. She surges across the surface in one direction then in another and threshes the water with her wings." In the meantime, the "other female, or females, leads the broods to another part of the lake or into marsh coves." As to yearlings, the author states that "none are in breeding condition", p. 132, but later says, "because of the excess of males over females, some yearling females may breed," p. 134. Survival of the young is high due to late breeding when cover is good, to efficient care by the females, and to the habit of adolescents of mingling with the wary molting adults and yearlings. One of the chief losses comes through the entangling of small young in weeds or algae. "Amphipods are the chief food of all age groups on the nesting ground."

10. Nesting of the Ruddy Duck in Iowa.—Jessup B. Low. 1941. *Auk*, 58: 506–517. Of 71 nests of *Erismatura jamaicensis rubida* in 1938–40, 52 were successful—73 per cent. Of 546 eggs, 379 hatched—69 per cent. "Predation was negligible because of the selection of nest sites above water." "The most destructive factor to Ruddy Duck nesting was fluctuations in the water level." p. 517.

11. The Mallard: Its Management in Western Montana.—Geo. L. Girard. 1941. *Journal of Wildlife Management*, 5: 233–259. *Anas platyrhynchos* is responding to protection on two refuges in the Flathead Valley. Females leave nests in the early morning and late afternoon for about two hours at each period. Males stay near, doing sentinel duty, till about the third week of incubation. (Male Shovellers (*Spatula clypeata*) assist females with care of young for the first two to three weeks.) Eggs hatched even after being flooded for 22 hours. Crows, coyotes, skunks and weasels were "diligently controlled." Success was high—71.2 per cent of 1,797 eggs hatching. The average number of eggs per nest was

7.13; the average hatch was five; "an average of four young reached the flapper stage."

12. Habits of the White-tailed Kite.—Robt. T. Moore and Arthur Barr. 1941. *Auk*, 58: 453–462. A nest of *Elanus leucurus majusculus* was watched from a blind 40 feet up on a ladder. On May 9 when the young bird was about $3\frac{1}{2}$ weeks old he was badly blown by wind; he had no "instinctive feeling of how to protect himself against the wind; indeed when a gust comes suddenly, he foolishly throws up a wing on the side toward the blow in an endeavor to maintain balance." The adults attacked Crows and Red-bellied Hawks, but allowed Sparrow Hawks, Bullock's Orioles and Western Kingbirds to nest in the same tree. On May 9 a whole mouse was left for the young; it took one half hour for him to dissect it.

13. The Breeding of the Black Oyster-catcher.—J. Dan Webster. 1941. *Wilson Bulletin*, 53: 141–156. *Haematopus bachmani* in the Sitka region is "bold in defense of its nest, intruding birds being attacked and struck until driven away." Crows and gulls were tolerated on feeding areas of the territory, but driven off when they came nearer than 25 yards from the nest. Bald Eagles, Hudsonian Curlews and Ravens were also chased off. Other Oyster-catchers were sometimes driven off, but more often " 'bowed off' in a piping ceremony." When a person intrudes, the birds give an alarm cry; they often "attempt to lead the intruder away, running along in a semi-crouching position," p. 146. When danger is over, birds give an 'all-clear' piping note. Parents call young to them to be brooded with "a clucking note, similar to that given by the incubating bird as it squats down on its eggs," p. 151. The pair change places both for incubation and care of the young at low tide, *i.e.* every twelve hours, the bird off duty standing guard and feeding itself. "Feeding begins on the second day, when food is brought by the parents to a point near the nest and offered in small fragments which are pointed out." Chicks follow the parents to the feeding grounds at the third to fifth week. By the fifth day the "chick picks insects off vegetation and rocks." One juvenile kept in captivity from the 35th to 60th day needed "120 large mussels per day." Incubation lasted 27 days. "The breeding territory of a pair of Oyster-catchers contains important feeding places; it is defended from April to August." Banded young were still with their parents when 57 days old. They do not breed until their third year.

14.—Some Breeding-Habits of the Black-winged Stilt. G. K. Yeates. 1941. *British Birds*, 35: 42–46. Two pairs of *Himantopus h. himantopus* in the Camargue were very excited at the observer's search for their nests ten days before the clutches were complete. Both parents were eager to incubate, relieving each other every five minutes or so!

15.—A Contribution to the Breeding Biology of the Palm-Swift, *Cypselus parvus*. R. E. Moreau. 1941. *Journ. East Africa and Uganda Nat. Hist. Soc.*, 15: 68–69, 154–170. An extensive study made by closely supervised African observers; at "one nest continuous dawn-to-dusk records were obtained for fourteen consecutive days. Nearly six hundred more hours of observations in continuous spells of six hours and upwards have been made at fifteen other nests." The birds paid no attention to observers within five to fifteen yards. They build almost exclusively on palm fronds—live or dead. They are highly sociable in the air and may be sociable in nesting. Feathers are collected in the air. The eggs are stuck on with saliva. Two eggs are laid on the continent and three in Madagascar where nests are larger. Incubation lasts 20 days and fledging 29-33 days, whereas with *Micropus caffer struebellii*, *M. a. apus* and *M. melba* the incubation period is the same, but fledging lasts 42 days. Of 35 eggs, 23 hatched and 6 young were fledged. The Fiscal Shrike (*Lanius collaris humeralis*) is probably responsible for much of the loss. The pair spend much time close together on

the nest pad, copulating there. The fastening of the egg to the pad is described. Both parents incubate, pressing tightly against the eggs; at night either may incubate, the other roosting alongside. The eggs were covered on an average 70 per cent of the hours of daylight. Sometimes they were left uncovered for three or even five hours, with no relation to weather or temperature. Seventy-five of the periods on lasted "over 20 minutes, nearly 30% of all spells over an hour." The brooding for the first week shows the "same curious admixture of assiduity and neglect" as with the eggs. Feeding is by regurgitation.

The number of feedings given during the first five days after hatching were 17, 16, 16, 27, 24. There was no special difference in rate except during the last hour of the day when feedings came to about four. At four nests with one young each the birds were fed on an average about 16 to 21 times a day; at three nests with two young about 22 to 32 times a day. This is about half as often as with *Psalidoprocne holomelaena* and about one-twelfth as often as with *Hirundo smithii*. An exceptionally interesting study.

16. Observations of *Lophoceros melanoleucos melanoleucos* (Lichtenstein) in South Africa. Gordon Ranger. 1941. *Ibis*, 14th ser., 5: 402–407. Two young Crowned Hornbills at leaving the nest did not differ in size nor plumage from their parents. The family had a territory about two miles square including a forested valley; this includes the nesting tree and several roosting sites which are well adapted for safety. When two families meet, there are special displays, loud cries and chasings.

17. Annual Cycle of the Black-capped Chickadee. 2. Eugene P. Odum. 1941. *Auk*, 58: 518–535. Both male and female *Penthestes a. atricapillus* excavate the nesting hole; the female carries material, mostly rabbit fur, accompanied by her mate. Six to eight eggs are laid. The female incubates, averaging 24 minutes on the nest and 7.8 off. The male feeds her, calling her off with a signal song. The incubation period is 13 days. The young were fed 6.5 times an hour when one day old and 14.4 times an hour when thirteen days old. They leave at sixteen days. At nine days heat production is well developed, but feathers are poorly developed. The weight at hatching is 1.13 grams, at 16 days 10–12 grams, as much as or more than the parents; there is little gain between 12 and 16 days. The first flights were as far as 20 to 30 yards from the nest; the parents flew about excitedly calling *phoebe* softly. At this time they showed "injury-feigning", flapping their wings back and forth, and moving their heads slowly from side to side. Banded young were seen with their parents 11 and 26 (second brood) days after leaving the nest; marked young separated from parents were seen 22, 23, and 34 days after leaving the nest. Fifty-three nestlings were fledged from 74 eggs—70 per cent success.

18. Technics in Life History Study. Eugene P. Odum. 1941. *Oriole*, 6: 1–7. Excellent outline of "Life History Topics" for study and a list of selected references.

19. Preparation of Nesting Data.—Frank Pitelka. 1941. *Auk*, 58: 608–612. Excellent suggestions as to subjects to be studied with a basic tabular form suggested for presentation of data.

TERRITORY

20. Psychological Observations on the Peck-order of the Domestic Pigeon.—(Psychologische Beobachtungen über die Rangordnung bei der Haustaube.) E. Diebschlag. 1941. *Zeitschr. f. Tierpsychologie*, 4: 173–188. Very interesting valuable work, analyzing the basis of the "peck dominance" found by Masure and Allee, 1934, in the Domestic Pigeon. This peck-order comes from the endeavor of each bird to defend a certain area from all other members

of the flock. "Lorenz (1935) rightly sees in this territory-delimitation a primitive behavior pattern of birds." Each male pigeon has a resting-place (center of action, Huxley) where he suffers no other male; he also has a more or less large "sphere of influence" where he dominates other males but allows them to stay. He dominates by display—impressive behavior (*Imponiergehaben*). This display is strongly "place-conditioned" (*ortsgebunden*), just as all territorial dominance is. Hens and Jackdaws have a more rigid peck-order, depending on individuality and largely independent of place.

In heterosexual flocks, one male pigeon is usually the top bird; this despot shows the greatest display and the largest sphere of influence, but his resting-place is no larger than that of his companions. He has to continually assert his dominance. Females have resting-places, but no spheres of influence. By decreasing or increasing experimentally the display behavior of a bird (scaring him or allowing him to intimidate stuffed birds), changes followed at once in the peck order. The despot was removed, the others were disturbed, quarrelled and drove the lowest one in the peck order out of his resting-place; he took refuge in the despot's place and soon had all the prerogatives of the latter.

The confidence of the bird is the all-important factor. The bird that soonest becomes familiar with a new place becomes despot. In four different places one group showed a change in peck-order, but after seven months' absence a return to the former locality brought a renewal of the former order. For mating the male has to have dominance; when two females pair, the dominant one takes the male part. It is difficult to get male pairs. The wife does not take the husband's rank as with Jackdaws and geese, where even the children take the rank of the parents. In maze tests birds low in rank did as well as those high in rank, except when a bird higher in rank was present in the room, even in a cage.

21. The Belligerency of the Kingbird.—David E. Davis. 1941. *Wilson Bulletin*, 53: 157–168. With *Tyrannus tyrannus* a territory is selected *after* pairing, not before. Incubation takes 16 days, fledging 16–17. One pair deserted three nests in turn; no eggs were laid, but the female "incubated" the empty nest for 15–25 minutes at a time exactly as if she had had eggs. "Both sexes go far from the territory to drive away a hawk or Crow." Both sexes drive away intruding Kingbirds, but only the male drove off other species that came near the nest. The author concludes that: "When a male Kingbird is fighting with another Kingbird within his territory he is simultaneously defending territory and sex-partner. The female defends the sex-partner only." This last phrase "refers to those actions of the male or female which prevent a rival from obtaining a mate," p. 165. It seems to the reviewer that another interpretation might be: both birds defend the territory, the male, being more belligerent, attacks other species as well as his own.

22. Behaviour of White Wagtails Wintering in Cairo District.—R. H. Greaves. 1941. *Ibis*, 14th ser., 5: 459–462. Individual *Motacilla alba* "exercised a territorial habit in feeding, and regularly frequented the same garden. A male would dispute his right with another male but generally tolerate a female on his territory, sometimes two, but as observations continued it seemed clear that the association was a loose one." Vast flocks roost in the sugar-cane; 470 were netted and ringed with Cairo Zoo rings.

23. Notes on the Spring Territory of the Blackbird.—David Lack and Wm. Light. 1941. *British Birds*, 35: 47–53. *Turdus m. merula* is a shy bird in South Devon. Twenty-five males and thirteen females were color-banded in the winter; nine males and two females proved to be residents. Males were very territorial, the territories comprising $1\frac{1}{2}$—$2\frac{1}{2}$ acres. "As with other territorial species, most encounters between males are settled by threat-display." The male "with lowered and retracted head, approaches gradually and indirectly in a series of hops, runs or very short flights." Stuffed specimens were ignored. "The

orange-yellow beak, inside of mouth and eyelid may be used as threat colors." "Round Dartington most male Blackbirds have staked out territories and possessed mates for several weeks . . . before they start to sing." "Hence, though unmated males sing somewhat more than mated ones, song would seem to have little or no survival value to the species at the present time, which is particularly curious in view of the beauty of the song." The Blackbird has conspicuous plumage and "pair-formation appears to have been pushed back to the autumn."

24. Display in Blackbirds.—H. Lambert Lack. 1941. *British Birds*, 35: 54–57. Remarkable communal display of cock Blackbirds in spring.

25. Territorial and Mating Behavior of the House Wren.—S. C. Kendeigh. 1941. *Illinois Biological Mon.* XVIII, No. 3: 1–120. $1.50. A 19 year study of *Troglodytes aëdon* in northeastern Ohio on Dr. Baldwin's fifteen acre estate, based on 331 matings of 142 males and 147 females. All adults and young were banded with aluminum bands, the adults being also given celluloid bands merely to distinguish sex, not individuals, as is usually done. Since the parents were caught at the nest and in later years not until the young had hatched, there is often uncertainty as to the identity of certain birds which would have been obviated had individual color-banding been used. The older the bird, the earlier the arrival in spring. Homing ability as tested by experiments is poor; one-third of 42 males removed from less than one-half mile to 2½ miles failed to return, while two-thirds of 10 females failed to return. Territories averaged one acre in size. The male builds the foundation of the nest, the female puts in the lining, lays 5–7 eggs and incubates them for thirteen days. Both parents feed the young in the nest for fifteen days and both (or the female alone) feed them out of the nest for another 13 days. Sex recognition depends on behavior. "In 70 first nestings terminating successfully and followed by remating for a second brood by both adults, remating of the same individuals occurred in 40 per cent of the cases," p. 53. "Remating of a pair the following year occurred in 42 per cent of the cases where both birds of the pair survived and returned to the locality," p. 118. Two birds remated for both broods three years in succession. Another pair mated three years in succession for one brood each year. One male had the same mate for both broods two years in succession, but five other mates in four other years. The histories of 215 individual territories are given with accompanying maps; it is difficult to follow the birds designated with the long band numbers. The paper contains a great deal of valuable material.

Other studies dealing with territory are Nos. 12, 13, 16, 27, 43, 53.

BIRD BEHAVIOR

26. An Experimental Analysis of the Breeding Cycle of the Tri-colored Red-wing.—John T. Emlen, Jr. 1941. *Condor*, 43: 209–219. An important paper based on a large number of well-planned experiments, and giving a discussion of the pertinent literature. A chart is given showing the activities of male and female *Agelaius tricolor* during the 37 days of the first nesting cycle; the female builds, incubates, broods and feeds the young, while the male, who is absent during incubation, helps feed the nestlings and fledglings. Experiments were made on 204 nests in two colonies, one with about 7,000 nests, the other with about 15,000. Forty experiments were made on nest building to test the possibility of shortening or lengthening the normal 3–5 day period; 15 nests were abandoned, but 20 tests were considered satisfactory. When the lining was removed, no new material was added. "Eggs or young artificially introduced into an incompleted nest will not necessarily interrupt the normal course of nest building activity," p. 212. When "nest construction was interrupted or delayed by natural factors the birds commenced laying without regard to the incompleteness of their nests." Twice when complete nests were substituted for nests just begun the birds laid after two and three day intervals.

Sixty-two experiments on egg-laying showed that the period was not prolonged by removal of eggs nor shortened by additions. "The rate of egg-laying was not affected by: (a) removal of nest lining . . . ; (b) the hatching of previously introduced eggs in the nest . . . ; (c) the presence of artificially introduced nestlings being fed by the male," p. 215. On the other hand, the normal incubation period of 11+ days was reduced by the addition of other eggs to 6, 5, 3, 2, 1, and 0 days. Nestlings "2 to 3 days of age were introduced into 10 nests where the laying phase was just being completed. In 2 of these the old birds deserted, in the other 8 the strange nestlings took precedence over the eggs, and the nest owners passed directly from laying into the feeding-the-young stage." (Since the males are normally absent for 11 days, how did they know they had young? Do they return each day for a visit?) Young are normally fed about 11 days in the nest and 2 weeks afterwards. Nine day nestlings were successfully exchanged for 2 and 3 day old nestlings, and 2 day young for 10 day young.

The feeding response did not appear during nest-building; introduced young were built into the nests or the nests were deserted. It appears in the male during laying and incubation, in the female during incubation. The author concludes: "The development of breeding behavior in the Tricolored Red-Wing is closely regulated by physiological factors from the start of nest-building through the initiation of incubation. During the rest of the cycle, however, the rate of development is largely controlled by external situations associated with the nest," p. 218.

27. The Behavior of the House Sparrow. (Ueber das Verhalten des Haussperlings (*Passer d. domesticus* (L.) .)—A. Daanje. 1941. *Ardea*, 30: 1–42. At last a real study of the behavior of this familiar bird. It was carried out with colored bands in some cases, while other birds were known through individual peculiarities. Sketches are given of various attitudes. Eleven different notes are distinguished. (a) Infantile call-note: this is kept in adult life; the female uses it as an invitation to copulation, both adults use it when changing places on the nest, and in calling fledged young, while the male uses it when calling the female to a hole for the second brood. (b) Species call-note "*Schilpen*", this is also the location note of the fledgling. (c) "Love-call-note", higher than the *Schilpen*; given by a male calling a female to his nest-box. (d) Social song of the males; *Schilpen* with variations. (e) "Courtship" *Schilpen*, louder than usual. (f) "Piew", seems to be used in most situations that call forth the infantile call-note; significance not clear. (g) Scream (*Angstruf*), uttered by a young bird when taken in the hand; adults come hurrying to the scene. Many species have similar cries of distress and they react interspecifically upon hearing them; once House Sparrows approached a screaming Jay. (h) "*Puttittit*", a note of unknown meaning. (i) "*Siep*", flight signal, stimulating others to follow suit. (j) Reactions to danger: *Krüü* call, given at appearance of a Sparrow Hawk (*Accipiter nisus*) or other hawks, the birds dashing into cover; *kwekew* call given for cats and people. The *krüü* call is also given for people when the males are busy with a song-fest; it may be that hiding from a hawk and being unwilling to leave are somewhat analagous.

The House Sparrow is territorial, proclaiming ownership of a nest box or cavity with definite boundaries to his possessions. Pair-formation takes place as follows: the male calls faster and louder from in front of his hole when a female passes by; if she comes to him, he shows himself and the hole to her. Sometimes he attacks her and other males join in the melée. If the female stays with the male, there is a "betrothal" period when the pair keep close together but copulation does not yet take place. The female learns the boundaries of the territory and defends it, fighting off females, while her mate drives off males. Many males remain unmated; there appear to be twice as many males as females in Eindhoven, Holland. House Sparrows appear to prefer to live in loose colonies; solitary males often remain mateless.

Building the nest and copulation begin at about the same time; both sexes

build, incubate and brood the young. From 20 hours' observation at 5 nests it was found that the male incubated in periods of 6–13 minutes, averaging 11; the female in periods of 9–17 minutes, averaging 13. The female incubated at night. From six hours' observation at five nests it was found that the male brooded from 3–11 minutes, averaging 7½; the female from 5–10 minutes, averaging 6⅓. The male postures and gives the infantile call-note to lure his mate to the site he has chosen for the second brood. The female takes most of the care of the fledged young, for the male may be more interested in starting the next brood than in the older young. Once when the author caught young and they screamed, the female went through a kind of "injury-feigning"—fluttering about near him and screaming herself; at another time a male parent showed somewhat the same behavior.

The puzzling subject of "courting parties" is discussed: the males gather (most frequently in February and March) and "court" and peck the female; the more the female pecks back the more will the males "court." A mated male drives off others that try to "court" his mate. The author believes this behavior is a remnant of primitive forcible mating (Lorenz' lizard type, 1935). He discusses cases where the male attempts to dominate the female at the beginning of pair-formation—the male Canary sings loudly and drives the female, while many birds indulge in "sexual flights" (Howard, 1920).

28. Food Detection by Vultures and Condors.—William Vogt. 1941. *Auk*, 58: 571. Two sheep were killed and placed on the coastal desert of Peru, 400 meters apart, one uncovered, the other covered with a single layer of gunny sack. Within an hour Turkey Vultures (*Cathartes aura jota*), Black Vultures (*Coragyps atratus foetens*) and Condors (*Vultur gryphus*) "were circling over the exposed sheep." The covered sheep was not found by the birds, even though small flies, twice the size of Drosophila had discovered it "across a half-mile of sterile desert."

29. Experiments on the Color Preference of Black-chinned Hummingbirds.—Frank Bené. 1941. *Condor*, 43: 237–242. Three *Archilochus alexandri* preferred yellow to any other color. "Color preference may be conditioned by training, as when a hummingbird trained to feed on colorless syrup remains constant to it, even when the colorless syrup is placed among feeders containing syrups of different colors."

30. Development and Enemy Recognition of the Curve-billed Thrasher *Toxostoma curvirostre*. Art. II. Results of the Archbold Expeditions, No. 34.—A. L. Rand. 1941. *Bull. Am. Mus. Nat. Hist.*, 78: 213–242. A very interesting account of the development of hand-raised birds. Seventeen thrashers were taken at the age of 14–18 days and most of them kept some eleven weeks. Physical growth and behavior of the nestling are described, also behavior after leaving, which normally occurs at 18 days; independence of adults comes at about 40 days. A great many experiments were made on "Response to Stimulus Objects, Enemy and Otherwise." Nineteen-day-old birds did not learn from painful experiences to avoid dangerous objects, but "29-to-35-day old birds responded more definitely but less so than the older thrashers." They did "not differentiate between rabbits and cats; a harmless animal and a predatory one," p. 239. They tended to "approach and peck at the smaller mammals, and to flee from the larger ones." Experiments with a "screech owl provide no evidence for a recognition of the owl as such," p. 240.

Towards snakes the birds instinctively spread their "wings in the horizontal plane while facing the snake at 18 inches to 2 feet distance," at the same time giving a "wooden 'kuk.' " The display of one bird did not seem to induce other birds to display, at least with birds up to 33 days of age, p. 233. The author considers it "a maladaptation," p. 241. This display was given to many things besides snakes. "The features that a non-moving strange dish of food, a moving

familiar box, a Mexican carrying a dead rabbit, and a quiet shadow have in common are that they have some strange, new characteristic; either motion, shape or proximity. We may conclude that the response is dependent on a complex or pattern of stimuli. Any one of a wide variety of stimuli may produce the response in less than optimum intensity or duration. But the pattern of stimuli furnished by a large snake alone elicits the response in maximum intensity and duration," p. 241.

31. The influence of Tameness on the So-called "Animal Hypnosis" in Birds. (Der Einfluss der Zahmheit auf die sogenannte "tierische Hypnose" bei Vögeln.)—F. Steiniger. 1941. *Zeitschr. f. Tierpsych.*, 4: 260–271. A better name for animal hypnosis is "inhibited reaction" (Reaktionshemmung). This is different from mere crouching which begins shortly after hatching with young gulls, shorebirds, etc., for in "inhibited reaction" the bird will stay on its back if placed there, and also flexibilitas cerea occurs. Young gulls show this behavior from about 3–6 days to 4 weeks or just before they can fly; it is released by the sight of an enemy and the warning cry of the parent. Sixteen young Common Gulls (*Larus canus*) taken at the age of 12–19 days were caged and fed; after one day there was no more "inhibited reaction"; they were no longer afraid of people and they no longer heard warning cries. It is evident that "inhibited reaction" depends on both physiological and psychological factors.

32. Non-Genetic Mating Preference as a Factor in Evolution.—John E. Cushing, Jr. 1941. *Condor*, 43: 233–236. With some birds the recognition of mates is an inherited matter—witness the Cowbirds; with others the mating preference is acquired, apparently at a very early age—pigeons, ducks, Jackdaw, Raven, Shell Parakeet, etc.

33. Some Aspects of Instinctive Behaviour and Display in Birds.—David Lack. 1941. *Ibis*, 14th Ser., 5: 407–441. The author attempts to define instinctive behavior and points out the difficulties. He suggests possible origins of different displays and stresses their present survival value, for they usually serve as a means of communication.

MOLT

34. Time and Course of Molt in Some Species of Ducks. (Zeitpunkt und Verlauf der Mauser bei einigen Entenarten.)—E. Stresemann. 1940. *Journ. f. Ornithologie*, 88: 288–333. An interesting discussion of the normal course of the molt and also of experiments. The male has four plumages: down, juvenal, breeding (*Prachtkleid*), eclipse. The female has four: down, juvenal, breeding (*Brutkleid*), resting plumage (*Ruhekleid*). The molt into the eclipse is not dependent on definite regression of testes; it apparently depends on the hypophysis. Perhaps a hormone keeps the female in henny plumage all the year, the male part of the year. The bright plumage of the male brings the sexes together and draws attention of enemies away from the female and brood. The bright plumage (*Prachtkleid*) is neutral since it is attained when the gonads are regressed. Cavazza (1938, Arch. d'Anat. Microsc., 31: 145–270) found that both sexes assume it after castration. The eclipse lasts only 3–5 weeks; all the primaries are lost as soon as this plumage is attained.

The author says that if the Black Duck (*Anas rubripes*) molts but once, then we can conclude that the double molt is an acquired characteristic of the Anatidae which came as a consequence of increasing sex dimorphism; but if it molts twice, then it would seem that the primary reason was renewal of worn feathers. Dr. Miles Pirnie informs me that Black Ducks do have an eclipse plumage, the drakes assuming it in late May and June. Tropical ducks molt but once a year, even if dimorphism is striking. Hybrids between ducks molting once and those molting twice have two molts (Heinroth, 1911). Females molt twice, but usually carry

the resting plumage till spring and have a fresh plumage before they nest.

There are two conditions in birds in the determination of plumages. In one both sexes possess the same inherited predisposition (*Erbanlage*) for feather coloring; the difference depends on hormones. In the other the inherited predisposition for the female lies in the heterochromosome; here there is a genetic male plumage and genetic female plumage as in the House Sparrow (Keck, 1934).

35. The Juvenal Plumage and Postjuvenal Molt of the Vesper Sparrow.—George M. Sutton. 1941. *Occasional Papers Museum Zoology, University of Michigan*, No. 445: 1–10. Each of three young *Pooecetes g. gramineus* began its post-juvenal molt when 18 days old. (Incubation lasted 12 days.)

36. The Plumages and Molts of the Young Eastern Whippoorwill.—George M. Sutton. 1941. *Ibid*, No. 446: 1–6. The post-juvenal molt of *Antrostomus v. vociferus* is "very gradual, requiring several weeks." Molt is a subject on which banders can make important contributions.

See also No. 37.

PHOTOPERIOD EXPERIMENTS

37. Effect of Photoperiod on Molting of Feathers.—S W. Lesher and S. C. Kendeigh. 1941. *Wilson Bulletin*, 53: 169–180. White-throated Sparrows (*Zonotrichia albicollis*) and a Bobwhite (*Colinus virginianus*), both of which have a partial spring molt, molted out of season when given increased day-length; they and House Sparrows (*Passer domesticus*) did the same when given decreased day-length. The more rapidly the light was decreased, the more rapid the molt, but the total time of loss and regrowth of feathers (65–73 days) "was approximately the same at all rates of decrease," p. 180. Weight "decreased during the progress of the molt and renewal of feathers."

38. Length of Day and Energy Requirements for Gonad Development and Egg-Laying in Birds.—S. C. Kendeigh. 1941. *Ecology*, 22: 237–248. To test the effect of light versus exercise on stimulating gonadal growth, 6 sets of English Sparrows, 8 in a cage were run; the 4 at 72° F. were: "controls", "exercised in dark", "lighted with food" (during the light periods), and "lighted without food"; the 2 at 36° F. were: "lighted with food", and "lighted without food." Added "light produced increased size of gonads in both males and females", but this was not the case with the exercised birds. These were not trained to the apparatus in the light; see Wolfson's suggestion (*Condor*, 1941) that non-training in daylight with Riley's English Sparrows and training with Rowan's Juncos explained the negative results of the former and positive of the latter. The food was cracked chick-feed and occasional green stuff. The 4 sets at 72° ate from 21 to 25 per cent of their weight daily, while those at 36° ate 28 to 36 per cent. The mortality in these last two sets ran from 32 to 57 per cent; in the first three from 5 to 9 per cent, and in the "lighted without food" at 72° 19 per cent. The fact that the birds exposed to the cold averaged no higher in weight than those in warm quarters shows that conditions were abnormal.

The second part of the paper deals with temperature relations with the eggs of the House Wren. It is a pity that the only comparisons made are those with domestic fowls, the large amount of data on eggs of passerines in *Transactions of the Linnaean Society of New York*, 4: 1937, chapter XII, being overlooked. Wren eggs increase in weight during one set, but decrease some 7 per cent later in the season. With Song Sparrows, on the contrary, eggs of 17 later sets averaged 13 per cent heavier than eggs of 17 early sets of the same birds. With the wrens the months involved are May to July, with the Song Sparrow April to June, so the temperature situation is different with the two species.

The weight of 16 first sets averaged 84 per cent of the weight of the female House Wren; that of 36 second sets 68 per cent. With the Song Sparrow the

weight of a set is approximately half that of the bird. With the wrens, the "average weight of eggs is greatest when their formation occurs at moderate air temperatures during the three days previous to laying and decreases when air temperatures are either raised or lowered." "Eggs of maximum size are produced at temperatures ten degrees lower (67° F. compared with 77° F.) during the first breeding period (May to late June) than during the second breeding period (late June to July)."

39. Light-Induced Egg Production in Large Pens Followed by Normal Nesting in Pheasants.—T. H. Bissonnette and A. G. Csech. 1941. *Journal of Wildlife Management*, 5: 383–389. Mongolian, Ring-neck and Black-neck Pheasants were night-lighted from January 3 to April 25; they began laying in February despite snow and low temperatures. "Severe weather reduced laying but did not stop it, indicating that it is a factor in the later stages of breeding, not in the fundamental activation." p. 388.

HEART RATE

40. Variations in the Heart Rate of Birds: a Study in Physiological Ecology.—Eugene P. Odum. 1941. *Ecological Monographs*, 3: 299–326. A remarkable study based on the use of a new instrument, the cardio-vibrometer, both on trapped birds in the laboratory and on incubating birds in the wild. In general the standard heart rate is inversely proportional to body size, 165 per minute with the Mourning Dove (*Zenaidura macroura*), 450 for the Song Sparrow (*Melospiza melodia*), 520 for the Black-capped Chickadee (*Penthestes atricapillus*), and 615 for the Ruby-throated Hummingbird (*Archilochus colubris*). "Maximum heart rates of 16 species taken following strenuous exercise are listed: in 6 of the smallest species a rate of 1,000 per minute or over has been recorded. Increase in heart rate as a result of muscular activity is very rapid. Acceleration in anticipation to movement has been noted in some cases, both in the laboratory and the field." "Food and mental activity have important effects on the heart rate of birds."

"The heart rate of two species (house wren and catbird) in nature was obtained by inserting the crystal under the nest and operating the recording instruments from a blind. During a daytime attentive period on the nest" the heart rate of the wren dropped from 740 to 600 per minute, that of the catbird from 480 to 375 at temperatures of approximately 80° F. "The heart rate of the incubating bird on the nest at night was distinctly higher than when the same bird was resting quietly on the nest in the daytime. This is correlated with the drop in air temperature and the increase in muscle tremors and general activity on the nest which occurred at night. In the house wren, the increase in heart rate at night amounted to 18%, accompanying a drop in temperature of 15° F. from 81 to 66° F.; in the catbird, a 26% increase occurred accompanied by a drop of 15° F. in air temperature from 77.5 to 62.5° F." These quotations are only samples of the important additions to our knowledge of bird physiology given in this paper.

CENSUSES

41. Audubon' Magazine's Fifth Breeding-Bird Census.—Joseph J. Hickey. 1941. *Audubon Magazine (formerly Bird-Lore)*, 43: sect. II: 480–500. The 40 censuses, totalling 1,535 acres are divided into the following categories: Bogs and Marshes; Deserts, Prairies and Fields; Maple-Beech Woodlands in Ohio; Coniferous Woodlands; Other Deciduous Woodlands. Twenty-four are "repeated on the identical areas covered in 1940"; with many, records are given for four years. The primitive salt marsh in New Jersey showed a density of over 400 birds per 100 acres; maple-beech woodlands in Ohio were much richer in bird life than oak-maple forest in Illinois, while Colorado desert in California was

better than original prairie in Oklahoma. These studies are of high value. More censuses are wanted, especially on extensive coniferous tracts and other areas "representative of a large region."

42. The Effect of Revegetation on the Small Bird Population in Arizona.—Gale Monson. 1941. *Journal of Wildlife Management*, 5: 395–397. In two 160-acre plots that had been over-grazed, 92 individuals of 12 species were found in mid-July; in two 160-acre plots protected for two years from grazing, there were 186 individuals of 14 species.

43. Visual and Auditory Conspicuousness in a Woodland Bird Community: a Quantitative Analysis.—M. K. Colquhoun. 1940. *Proc. Zool. Soc.*, London, A, 110: 129–147. A refined technique of censusing, based on a study of relative conspicuousness. The breeding population of an 11 acre mixed copse was 123 individuals in 1938, 111 in 1939; the number of individuals identified in a series of "slow daily walks" in this copse at the rate of one-third of a mile per hour was counted. "The coefficient of relative conspicuousness for each species is the actual population, expressed as adults per acre, divided by the number of adults per hour," p. 131. The Chiffchaff (*Phylloscopus collybita*) was four times as conspicuous as the Hedge Sparrow (*Prunella modularis*), the coefficients being .22 and .86 respectively.

Many birds with songs that carry far have correspondingly large territories. By multiplying the length of a song by its frequency, one finds the "*approximate* values of absolute song in minutes per hour," ranging from 18 minutes per hour with the Chaffinch (*Fringilla coelebs*) to 30 for the Chiffchaff. "The function of song is advertisement. The function of territory, at its lowest denominator, is privacy . . . the greater the privacy insisted on, the more need for advertisement," p. 143.

44. The Density of Woodland Birds Determined by the Sample Count Method.—M. K. Colquhoun. 1940. *Journal of Animal Ecology*, 9: 53–67. A time unit with "a slow observing speed" is advised rather than a space unit. According to the "coefficient of conspicuousness" the Chiffchaff was found to be 3¾ times as conspicuous as the Whitethroat (*Sylvia communis*).

45. The Birds of Savernake Forest, Wiltshire.—M. K. Colquhoun. 1941. *Journal of Animal Ecology*, 10: 25–34. Counts of birds in this mature oak forest are discussed in the light of "relative conspicuousness." It is feared that the Forestry Commission will make drastic changes in this area; if they destroy the hawthorne scrub, the insectivorous birds will be driven away and the forest itself adversely affected.

46. The Density of Downland Birds.—M. K. Colquhoun and Averil Morley. 1941. *Journal of Animal Ecology*, 10: 35–46. An interesting discussion on the "conspicuousness of downland birds," analyzing the characteristics of and computing the identification distance for each species. By "using a 'normal identification distance' for each species" the attempt is "made to compute the actual density per square mile," p. 45. The total population per 100 acres was computed as 14 in winter, 35 in the "pre-breeding" season and 32 in the breeding.

47. The Status of Migratory Game Birds: 1940-41. 1941. U. S. Fish and Wildlife Service Leaflet, 196: 1–28. In January 1939 the continental population of ducks and geese was estimated at about "65,000,000,or about half of the number that existed in 1900." More than 1,200,000 hunters purchased Duck Stamps. Woodcock, Wilson Snipe and Rails are decreasing in numbers, while the "mourning dove is probably at its lowest point in history," particularly east of the Mississippi River, due to winter losses and "heavy over-shooting."

BIRDS AND THEIR FOOD

48. Food of Ducks and Coots at Swan Lake, British Columbia.—J. A. Munro. 1939. *Canadian Journal of Research*, 17: 178–186. Examination of 136 stomachs showed that "competition for food between ducks and coots during the autumn months is negligible."

49. Duck Food Plants of the Illinois River Valley.—Frank C. Bellrose, Jr. 1941. *Bulletin Illinois Natural History Survey*, 21, Art. 8: 237–280. A very fine study on water levels, effect of floods and drought, turbidity, different factors in plant abundance, important duck food plants, plant competition, management recommendations. The bulletin is illustrated with maps and many photographs.

50. A Study of the Fall Food Supply of the Ring-necked Pheasant and the Bob-white Quail in Washington County, Rhode Island.—Thomas Wright, Jr. 1941. *Journal of Wildlife Management*, 5: 279–296. The "chemical composition of weed seeds shows them to be dietetically superior to the common cereal grains in protein and fat content . . . Skunk cabbage fruits and snapweed seeds have a very high nutritive value."

51. An Experimental Study of Browse as a Winter Diet for Prairie Chicken.—F. N. Hamerstrom, Jr., F. Hopkins and A. J. Rinzel. 1941. *Wilson Bulletin*, 53: 185–195. Unlike its relatives, *Tympanuchus cupido americanus* was found incapable of surviving in winter on browse unsupplemented with grains. "Too much cultivation has driven Prairie Chickens from most of their original range; too little is having the same effect in parts of their acquired northern range, where areas once open are growing up solidly to brush," p. 186. "Perhaps on their original range and under original conditions Prairie Chickens subsisted on the typical grouse regimen of low concentrate foods." It may be that "the fact that they were adaptable enough to alter their type of feeding has made it possible for them to extend their range so far north of their original limits," p. 194.

BOOKS

52. Factors Affecting the General Status of Wild Geese and Wild Duck.—Percy R. Lowe, et al. 1941. International Wildfowl Inquiry, I. Cambridge University Press, N. Y. Macmillan. $2.25. 123 pp. An important report by a special sub-committee of the British Section of the International Committee for Bird Preservation, calling attention to the great dangers facing wild duck and geese with "increased facilities of travel and transport," "cold-storage and commercialization," destruction of eggs and birds in the Far North, "ill-considered reclamation of unsuitable areas of land" especially in central Europe, spread of human populations into the tundra of Siberia and Scandinavia, "silting of mud in estuaries," "disturbance by aeroplanes," hunting seasons that begin too early and last too late. Great slaughter of ducks takes place in the "decoys" in Holland and by shooting in Hungary, Egypt and India. Seven chapters, each by different authors treat of conditions in northern breeding areas, the distribution of eel grass, British decoys, punt-gunning, ringing of ducks and "Close Time." The situation for wildfowl is alarming throughout the world. Let us hope that with drastically shortened hunting seasons, stopping the sale of game, limits on bags and methods, and protection at the breeding grounds, as well as refuges, the birds can be saved before it is too late.

53. A Behavior Study of the Common Tern (*Sterna hirundo hirundo* **L.**)—Ralph S. Palmer. 1941. Proc. Boston Society of Natural History, 42: 1–119. Two seasons were spent studying the terns at the Sugar Loaf Islands in Maine, but in neither year did the author arrive early in the season. Banding and various methods of feather marking were used; also a "fairly large number of tern speci-

mens" were collected from the observation tent, after "recording the behavior." Sketches are given of various postures, "mostly line drawings made from photographic images projected directly on drawing paper." Part One deals with "The Environment in the Breeding Season," emphasizing the need for isolation, for a nearby source of food, and for suitable ground conditions. Under "Associates" the author doubts the suggestion made by Fabricius (1937) and Hartman (1937) that ducks preferred nesting on islands with breeding colonies of Laridae for the protection afforded from Crows, saying that terns arrive after the ducks have started to nest. Rintoul and Baxter (1924, *Scottish Naturalist*, 148: 110), however, say that on the Shetlands "the first nests of the Eiders were very much harried by the Gulls, Ravens and Hoodie Crows," but when the terns arrived, they "kept off the Gulls and other marauders . . . so the Ducks got a chance, and although late, twenty or thirty of them got away with young ones."

The literature on terns is well covered, so much so that it is sometimes difficult to know just what is based on personal observation. For instance, it is not clear whether the evidence for "the pecking ceremony whereby the territory holder determines the sex of his companion" is based solely on the one instance recorded June 29 (p. 47), or whether it has been seen often and by different observers; if the former is true, too much is concluded from what may have been an aberrant behavior pattern. It is not plain just why the "bent" attitude "is for intimidation" and "the erect one indicates submission." It also seems a little far-fetched to call the "formalized preening" in flocks "substitute behavior"—"the result of a tension . . . because the social drive is opposed to the dominance drive," p. 100.

Many interesting facts are brought out on social behavior—fishing, bathing, "up flights" and social attacks, as well as on behavior of young. "Adults and young recognize each other when the latter are five days old." Common Terns hatched eggs of Roseate Terns (*Sterna dougalli*), "but did not rear the young, because the begging note of the latter species is weaker and will not stimulate a feeding reaction." Young terns swim much until they can fly; the first flight comes at about 30 days and the young may be blown out to sea.

Nests may be as near as 17 inches to each other, but in such a crowded colony more young are killed by neighbors than where pairs are more widely spaced. "A male or female on its territory will almost invariably fight an intruder regardless of the sex of the latter," p. 54. "In the highly social Common Tern, the value of territory seems to be that it gives individuals sufficient room in which to carry out individual reactions necessary for the continuance of the species, while at the same time leaving the birds so situated that many social reactions, which are beneficial to the group as a whole, can occur," p. 56.

54. Birds in Your Backyard.—Virginia S. Eifert. 1941. Popular Science Series, Vol. II. Illinois State Museum. Springfield, Illinois. 249 pp. Paper. 60 cents. This is "a series of word and brush impressions of the birds of Sangamon County, Central Illinois, and the Illinois State Museum, about the places in which they live, and their association with trees and lakes and open fields." Some hundred species are pictured with full page sketches by the author and an "appreciation" on the page facing. The pictures are of uneven value, many amateurish, some charming, while most give a pretty good idea of the bird and its haunts. The "appreciations" are written in lively, informal fashion; one wishes the author had used all the space available and told more about each bird. It is too bad that the incubation period of the Cowbird is given as 9 to 10 days instead of the correct period—11 to 12 days—as found by Hann and the reviewer. There are short chapters on feeding birds, birds to be found in Springfield and vicinity, a list of helpful books, a check list of birds of Sangamon County, briefly annotated, a delightful diary—"the Year of Birds"—with observations each week, and an index. A book that should do much to arouse interest in birds in central Illinois.

55. The Road of a Naturalist.—Donald C. Peattie. 1941. Boston. Houghton. 315 pp. $3.00. This is a different kind of autobiography. We travel

with the author as he writes the book: interspersed with chapters on the fascination of the Mohave Desert and the glory of the great forests of the Northwest, we read of Mr. Peattie's ancestors, boyhood and early manhood, his wanderings in many places over this continent and in France. "In Nature the only barrens are the cities; these are all a howling wilderness where neither lion nor jackal dare set foot." He points out the qualities necessary in city birds, yet when he credits the English Sparrow with four broods a year, it should be noted that banded birds have been shown to raise only two broods, as Dr. Weaver informs me. (Two other slips should be mentioned: the only undisputed new avian species discovered in eastern North America in this century is the Cape Sable Seaside Sparrow (*Ammospiza mirabilis*); Audubon did not do the first banding, since a Grey Heron was ringed as early as 1710.)

The Road of a Naturalist takes us through an ever-changing landscape, showing us the wonders of nature and inspiring us to greater awareness of the life about us. Mr. Peattie writes eloquently of the love of life in bird and beast "in every scampering quadruped the tingling adventure of hour-to-hour existence—felt intensely, thought about never." And in these troublous times he hopes that man will change and improve and "some newer species not merely intelligent but wise, may walk the earth, deserving of his place on it in the ancient sunlight."

56. Courtship and Display Among Birds.—C. R. Stoner. 1940. London, Country Life. 140 pp. This book was written for "the non-specialist, interested in natural history, and for ornithologists who have not had time to go deeply into this branch of their subject." He states the theory that courtship display "makes a strong impression on her [the female's] eye, is flashed back to the brain and to the pituitary gland, which sends its message out to the rest of the body," i.e. to secrete hormones. Nuptial flights of shorebirds are "warning displays." Most birds have to be inconspicuous most of the time; some display hidden colors in courtship or show unusual flight or gait; some shed their plumes and bright plumage after the breeding season. The most gorgeous birds are forest dwellers. Much of the effect of display depends on its suddenness. The courtship of Grebe, Ruff and Mallard is compared. The author leans heavily on Marshall (1936). Only 29 authors are cited, Lorenz, Tinbergen and Lack all being omitted.

57. The Birds of America.—John James Audubon. Edited by William Vogt. Second ed. 1941. N. Y. Macmillan. $4.95. This gorgeous volumne of Audubon's prints with Mr. Vogt's excellent introduction and pertinent remarks under each species is now available at a much lower price than the original edition.

58. Speciation in the Avian Genus Junco.—Alden H. Miller. 1941. University of California Publications in Zoology, 44(3): 173–434. An outstanding contribution to the study of Junco evolution, including sedentary and migratory species and races, ranging from the tree limit in Canada and Alaska to Panama. The author is particularly successful in analyzing the approaches that should be made in interpreting the complex of phenomena of speciation. However, a review of this volume to be of real value to those specializing in evolutionary studies would require many pages of *Bird-Banding*, since the author in his "Discussion and Summary" devotes 27 pages to the subject.—C. L. W.

59. Pageant in the Sky. A Book of the Modern Sport of Bird-Watching Raymond S. Deck with photographs by the author. New York, Dodd, Mead & Company. October, 1941. $3.00. pp. i-xiv + 268.

A book written by an enthusiast for amateurs. In a small compass this book touches on a variety of subjects in no especially logical sequence:—the mystery of migration, flyways, feeding birds in winter, bird houses, planting to attract birds, introduced species, courtship, nesting, sex, "the mystery bird" [woodcock], extinction of the Passenger Pigeon, classification, bird-banding, origin of ver-

nacular names, observation, and the water fowl situation, to mention the more prominent subjects. Intended as it is for beginners, the value of *Pageant in the Sky* could have been greatly increased if somewhere the author could have given a list of books and other references where the subjects so briefly touched on by him might be studied in greater detail. The photographic illustrations are not outstanding; judged by standards of a generation ago they are acceptable but do not measure up to present-day photographic work either in technical excellence or in composition.—J. L. P.

ANNOUNCEMENTS

Regional Meetings of the Northeastern Bird-Banding Association

The Northeastern Bird-Banding Association plans to hold a series of out-of-door regional meetings during 1942 at various bird-banding stations in New England. These meetings will allow banders to get acquainted with one another, see trapping operations at some of the larger stations and have an opportunity to inspect traps and discuss trapping technique.

A committee has been appointed by the president to take charge of the arrangements for these meetings. This committee consists of Mr. C. Russell Mason, Chairman, Dr. George F. Wallace, Dr. Richard Weaver, Prof. Frederick A. Saunders, Mrs. Kenneth Wetherbee and Mr. Edwin A. Mason.

The first meeting will be held at Dartmouth College at Hanover, N. H., where we will be the guests of Dr. Richard Weaver. The date for this meeting has been tentatively set for Saturday, March 21, 1942.

Other meetings planned for the year will be held at the Austin Ornithological Research Station at North Eastham on Cape Cod, at the Moose Hill Sanctuary at Sharon, Mass. and at the Pleasant Valley Bird and Wild Flower Sanctuary at Lenox, Mass. The meeting at Lenox will be held in early October and will probably be a two day meeting with the members spending Saturday night in Lenox.

The plan is to invite the members of the Eastern Bird-Banding Association to the meeting at Lenox.

Post cards will be sent out to members announcing the date and place of each meeting. If anyone has any suggestions regarding these meetings Mr. C. R. Mason, the Chairman, will be glad to hear from them. Mr. Mason's address is 66 Newbury St., Boston.

THE Council of the Northeastern Bird-Banding Association is anxious to increase the number of general notes appearing in Bird-Banding. The members of all the bird-banding associations are urged to send in short notes that can be published in each issue.

There is important information, no doubt, in the files of many bird-banders which may not be sufficient for an article but which would be of interest to our readers if published in one or more short notes. Information is especially desired on the recovery of fledglings the first or subsequent years after banding, returns of adult birds recovered at points other than the place of banding and ages of banded birds.

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